



FRIDAY, JANUARY 25, 1878.

## The Billerica &amp; Bedford Two-Foot Gauge Railroad.

III.

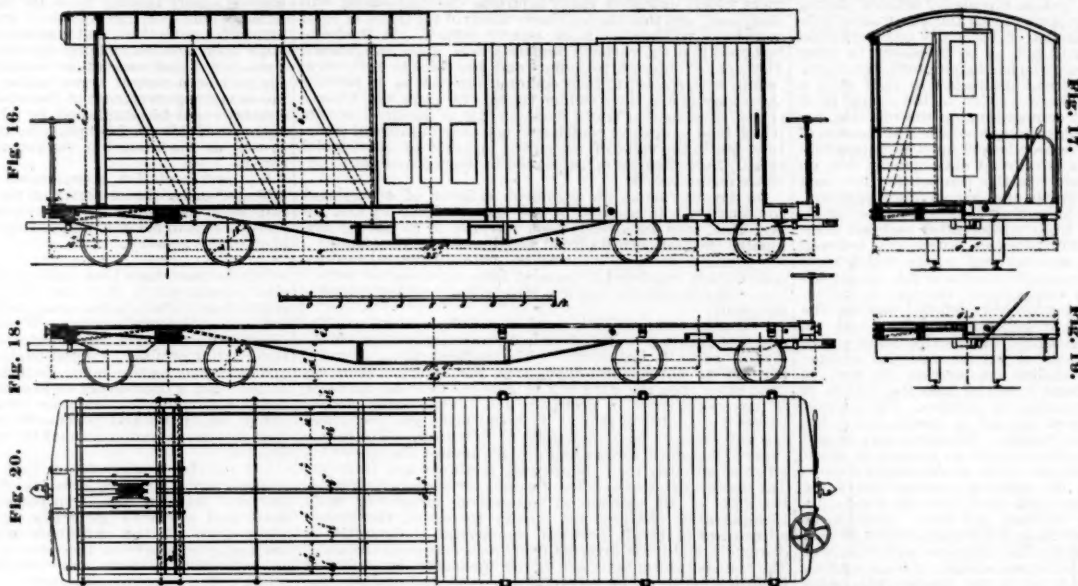
We give this week engravings of the box and flat freight cars, the trucks for same, and the excursion cars of the Billerica & Bedford Railroad. The latter are the same as the flat car excepting the seats and the roof or awning over

the competition for what remained grew constantly sharper, until through rates fell to a point then considered unremunerative. This resulted in what was known as the "Saratoga Combination" of 1874, through which the managers of the railroad lines attempted not only to establish common rates, but to make those rates binding upon each party to the combination through a central executive organization. The Saratoga Combination was briefly referred to in the report of this Board for 1875 (Sixth Annual Report [1875] pp. 39-41). Before the close of the year 1874, however, it had practically broken down, and a war of competition of unprecedented severity followed, which lasted almost without any cessation throughout the years 1875 and 1876. It came to a close in December, 1876, at the time the last report of this Board was passing through the press. In that report (Eighth Annual Report [1877] pp. 46-60), and in the report for the previous year (Seventh Annual Report

[1876] pp. 60-72), the causes of this struggle and the consequences involved in it were discussed at considerable length, so that any further allusion to them now is unnecessary.

Proceeding at once to the striking events in the gradual development of what is usually spoken of as "the railroad problem," which have marked the year 1877, it is safe to say that no year since the discussion of that problem began to occupy any considerable share of the public attention has been more noticeable. This, too, wholly apart from the July labor disturbances. An episode which excited great attention at the moment, these will probably in the long run be found to have exercised not the slightest influence on those final results which evidently are working their way out by a process of their own, and, as the Commissioners remarked a year ago, "probably with little regard to the theories now advanced in respect to them."

Another and earlier episode in the process of development,



BOX AND FLAT CARS FOR THE BILLERICA &amp; BEDFORD RAILROAD.

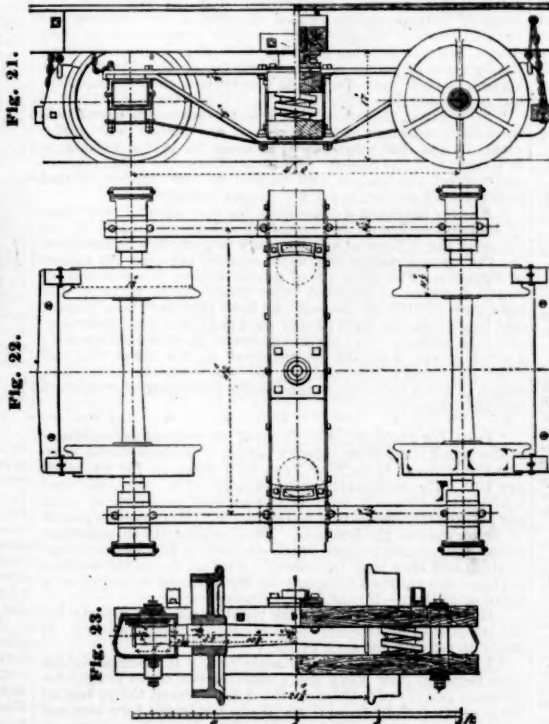
the seats. The box and flat cars are 22 feet long over the body and 6 ft. 2 in. wide, or more than three times the width of the gauge. The weight of the box car is 5,800 lbs. and the capacity 16,000 lbs. The flat cars weigh 4,500, with the same capacity as the box-car. The excursion cars weigh 5,500 lbs. and have seats for 55 passengers. The road has one box-car, six flat cars and two excursion cars. They are all equipped with the Miller coupler. The drawings represent their construction so clearly that no further description is needed, excepting perhaps to enumerate the different engravings. Fig. 16 is a side and fig. 17 an end elevation and fig. 20 a plan of a box freight car. Fig. 18 is a side and fig. 19 an end elevation and fig. 20 a plan of a flat car, the plan being the same for both the flat and box cars. In all these views the outside is shown by the right half of the engraving and the framing by the left half. Fig. 21 is a side view, fig. 22 a plan and fig. 23 an end view of the freight-car truck, which is also used under the excursion car. Fig. 24 is a side view, fig. 25 is an end view and fig. 26 a plan of the excursion car.

Next week or the week after we will publish engravings of the passenger cars.

## The "Pooling" Combinations of 1877.

[From the Ninth Annual Report of the Massachusetts Railroad Commissioners.]

In each of the more recent reports of this Board, the Commissioners have endeavored to review the course of railroad discussion during the year then just closed, and to indicate as clearly as they could the apparent direction in which the development of the system was tending. In 1874 there was an alarming decrease in railroad receipts, and a consequent shrinkage in the value of railroad securities, following the financial collapse of the year previous. As the volume of business decreased,



FREIGHT AND EXCURSION CAR TRUCK.

though a far longer and more important one, was the Granger movement of 1872-74, with its thorough discussion of the legal status, including the duties, rights and obligations of the railroad corporations. This, as is becoming more and more apparent, was a phase which had to be gone through with as a preliminary to a better and more healthy condition of affairs, and it is already apparent that, like most thorough and prolonged discussions, it resulted in very little that was not good.

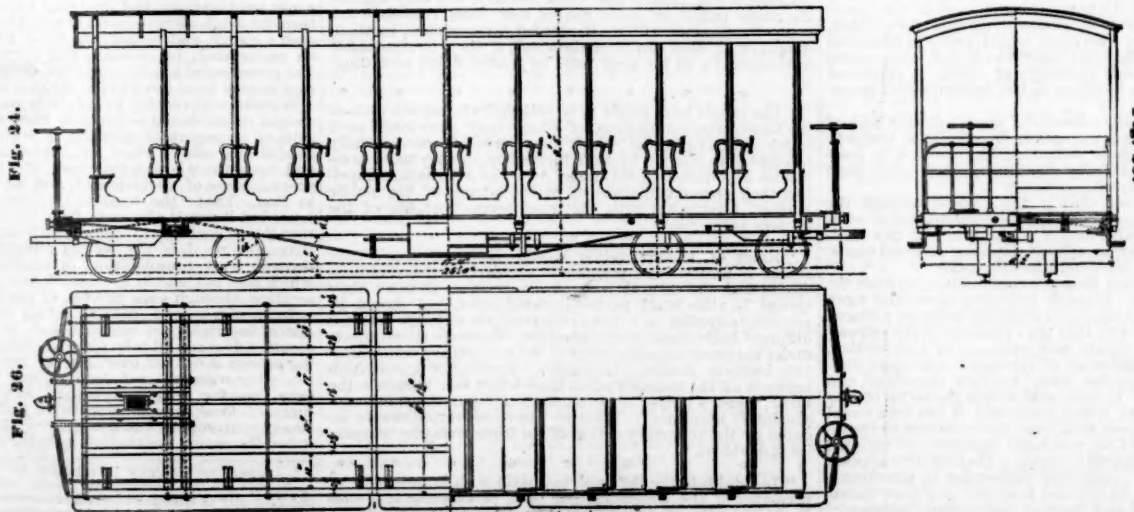
Other phases in the process of development have since followed in rapid succession. As the three years, 1874-6, were a period of fierce competition, so 1877 has been the year of combination—the "Pooling" Year. Never, at any time, has the spirit of yielding and harmony among themselves been so manifest in railroad men as during this year; and for the first time the combinations agreed on by them have been based on principles which rendered it possible to make them effective. That this should have been so was no more than natural. The violent action of the three previous years was sure to result in a reaction, the extent of which even might with tolerable certainty have been predicted.

Besides the numerous smaller combinations, intended to cover only a limited territory and to control comparatively insignificant amounts of business, there are eight larger ones which now present features of especial interest. These are what are generally known as—

- (1) The Omaha Pool.
- (2) The Southern Railway and Steamship Association.
- (3) The Southwestern Rate Association.
- (4) The Colorado Pool.
- (5) The Cattle Pools.
- (6) The Oil Pools.
- (7) The West-bound Freight Pool.
- (8) The East-bound Freight Compact.

[The report here gives a description of each of these eight plans, all but two of which have recently been described quite fully in these columns. We omit these descriptions and pass over to the discussion of the general question of the policy of such combinations, with which the report closes.]

The effect of these combinations and their tendency to development remain to be considered. They are being perfected with great rapidity, and their avowed



EXCURSION CAR FOR THE BILLERICA &amp; BEDFORD RAILROAD.



ultimate object is the control of competition among railroads. From that point of view which looks solely to the interests of the public, how should they be regarded?

It is, of course, unnecessary to say that all combinations of the character which have been described are looked upon with much popular distrust, and are held to be against well-established considerations of public policy. In the minds of the great majority, and not without reason, the idea of any industrial combination is closely connected with that of monopoly, and monopoly with extortion. In view of this fact, well established in common experience, the question is very pertinently asked, why should a railroad combination, avowedly intended to hold competition in check, if not to put an end to it, produce any result other than the natural and obvious one of raising prices?—Who or what is to protect the community against the extortions of these great corporations, should they cease to quarrel and compete among themselves? This subject has been so repeatedly debated during the last few years in the reports of this and many other public boards, and in the columns of the daily and periodical press, that it certainly ought not to be necessary to enter again upon it here. No one who has taken a sufficient degree of interest in the long railroad discussion to read even a small portion of what has been written in the course of it can any longer doubt that competition, on the one side, has furnished the great stimulus through which a succession of what would otherwise have been looked upon as impossibilities has been accomplished in railroad development, nor, on the other hand, can he doubt that this competition has been a most costly process of harsh and unjust discrimination. It was, indeed, this discrimination, necessarily inherent in, and wholly inseparable from uncontrolled railroad combination—the flagrant and notorious differences between through and local rates, and between points which were controlled and points of competition—it was this which led to the indignant, though unintelligent, Granger agitation. The people of the West instinctively rebelled against the practice of a gross and systematic inequality, and refused to see that the hardships of discrimination were inseparable from the benefit of an uncontrolled competition. They tried to equalize competition by law, or rather to supplement natural laws and heal the defects in their practical working by means of statutes. The attempt was one which it was natural enough to make, and it has certainly not been barren of results. Whatever may be said of the Granger legislation, there can be no manner of doubt that the popular manifestation which accompanied it exercised a great influence on the railroad corporations of the country. The abuses which had crept into the system underwent most gratifying reforms, and many positions as respects discrimination, which in 1870 were stoutly denied, are now generally accepted. The Granger agitation was the farthest possible from being an example of force wasted. Meanwhile it wholly failed to touch the fundamental point at issue. The question still remains an open one, whether, with all its evils, competition, as it has hitherto existed, is not the best and final solution of the railroad problem, so called?—or whether some other solution will yet be evolved by a gradual process, of which the pooling combinations of the present time are a part, with the final result that the benefits incident to competition will be secured, while its hardships and abuses will be greatly modified, if not by degrees wholly gotten rid of?

The discussion has now almost wholly lost its hold on the public attention and is confined to a few persons. But by them it has been carried far beyond the elementary principles of a few years ago, and, while the cant phrases, popular appeals and violent denunciations which made up so large and necessary a part of its earlier stages are no longer heard, the conditions which underlie it begin to be appreciated. It has become a simple discussion of facts and principles directed to a definite result, which can be brought about, if at all, only very gradually, and at a time and through processes which cannot now be foreseen. Yet, if any such solution as that which has just been suggested is within the range of probabilities, it would not be easy to overestimate its importance. The argument, for and against, can be stated in the few words.

On the one side are the considerations which lead to a belief that competition among railroads, as it has hitherto existed, is destined to continue permanently, and, taken all in all, affords in spite of its recognized abuses the best practical guaranty of the public interests; and, on the other side, the considerations which lead to the opposite belief, that uncontrolled competition is but one phase in railroad development and must result in some form of regulated combination. The first of these views has, during the past season, been very clearly stated in the first Report on the Internal Commerce of the United States:

"The evils incident to competition are sharply defined and incisive, but the benefits it affords are substantial and pervading. The beneficent law of supply and demand where it operates most freely may not secure systematic justice, and yet the whole world concedes that, so far as it is operative, it secures substantial justice. This is all that can be expected in the present condition of human affairs. Competition may not make all things even, but it affords a nearer approach to equitable dealing among men than any substitute which has yet been proposed for the natural laws of trade. The very instability of competition is the surest safeguard of the public interests. When competition ceases to be irresponsible, monopoly will step in, unless it be substituted by the autocratic rule of a combination sufficiently powerful to control all the transportation lines of the country. Any arbitrary rule in whatever manner formulated, or by whatever agency exercised, would prove to be an impotent substitute for the great beneficent law of competition in the irresponsibility and instability of which is embraced that conservatism which inheres in the untrammelled operations of natural forces.

"So intimately are the interests of transportation and of trade connected, that it is impossible to eliminate competition between the railroads without doing violence to commercial interests, and thereby working greater evils than those sought to be removed.

"It has been supposed that in the contests between the trunk lines the strongest company or combination of companies invariably remains master of the field. It has, however, come to be almost an aphorism among railroad managers that the weakest line determines the rates.

It has also been supposed that the combination between the railroads of the country is yearly becoming closer and more powerful. The facts which have been heretofore adduced seem to indicate, however, that the extension of the railway system has tended to create new elements of competition, and to render the adjustment of through routes more difficult. Every trunk line has many interests outside of, and which cannot possibly be embraced within the terms of, any combination with other trunk lines; and it has been found that sooner or later these collateral interests lead to the infraction of any conditions which the ingenuity of railroad managers has yet been able to devise. The difficulty appears to be that, heretofore, competing companies in attempting to protect themselves, have failed to arrive at a clear understanding of the nature and limits of their mutual interests.

"As the promoters of the great railroad organizations connecting the west with the seaboard have pushed their lines westward, they have seen their control over 'through rates'

gradually becoming weaker and weaker, and the idea has been suggested in the interests of the railroad companies, by able men, that the roads ought to invoke some external aid in order to maintain remunerative rates, or at least to avoid the necessity of at times carrying through freight at an absolute loss. Evidently, it would be detrimental to the public interests if the railroads of the country were to become crippled by their own excesses, but, in view of the beneficial results which have been realized from the regulating influence which competition has exerted over rates, in the great commerce between the West and the East, and between all important centres of trade which enjoy the advantages of two or more rival lines, the people will watch with favor the gradual extension of the railway system by which means the limits of the local or non-competitive traffic are being contracted, and the limits of competitive traffic enlarged.

"It appears probable as the facilities of transportation are more widely extended many injurious discriminations will disappear, and that the legitimate limits of the traffic of rival companies will become more clearly defined. It is also to be hoped that the various companies will, upon enlightened views of self-interest, formulate and acquiesce in such regulations with respect to their common interests as to prevent the occurrence of those sudden changes of rates which cause erratic diversions of traffic from one line to another; results which tend to destroy confidence not only in railroad securities, but in the value of the entire property of commercial cities. Such changes of rates tend to depress and not to advance commerce."

On the other hand, the argument in favor of a regulated combination is thus stated in the same volume by Col. Albert Fink, who has already been referred to as having originated the Southern Railroad and Steamship Association:

"A proper distinction should be drawn between healthy competition, regulated by natural laws upon correct principles, and competition which is merely the result of mismanagement.

"Healthy competition is continuous in its operation. The effect of railroad wars, or railroad mismanagement, in reducing rates is spasmodic. The natural laws of competition do not regulate changes in the tariffs. They depend often upon the mere will of a single railroad manager or may result from an obstinate and unreasonable quarrel between a number of them. Personal pride and prejudices not unfrequently have something to do with it. The people cannot, therefore, foresee and provide against changes which affect so seriously their commercial relations and interests. The market value of articles of commerce becomes unsettled, the risks of all commercial transactions (depending upon transportation charges) are greatly increased, the proper adjustment of tariffs between commercial communities is disturbed, and trade diverted from its accustomed channels. The transportation taxes are borne unequally by different localities, giving undue advantage to some, and unjustly discriminating against others."

"It is this excessive competition and the ruinously low rates of transportation caused thereby which reverse the natural order of things. And as this competition is spasmodic, often depending upon the will of a single individual, the fortunes of people of great sections of the country, the success of their manufacturing enterprises, their prosperity, etc., are made dependent upon their slight threats.

"No wonder, therefore, that great complaints about railroad discrimination have come from the people who suffer under it, and that attempts were made to prevent the same in so many of the States. Unfortunately, the people do not understand the causes and nature of the difficulties, and could, therefore, not apply the proper remedy.

"It is the excessive competition, the unreasonably low rates of transportation on the competitive business, which is the cause of the difficulty, and the only remedy lies in distributing the transportation-tax more equally between all classes of shippers. The principle of proportioning this tax according to distance, to establish rates based upon mileage, has been embodied in all the railroad laws that have been passed, and this principle, with proper modifications, is no doubt correct; but instead of trying to enforce it upon the railroads in a single State, it should be enforced at the same time all over the country, not applying to way business alone, but, which is much more important, to the competitive or through business everywhere."

"Take, for example, the effects of the present railroad war of the trunk lines upon interior cities. Manufactured articles are brought from New York to Louisville for 21 cents per 100. The same articles manufactured in Syracuse, and which were formerly used in this market, cost now 40 cents per 100 for transportation to Louisville. Of course the people of Syracuse lose the business. The investments in manufactures at Syracuse become valueless; before the railroad war is at an end they may be ruined. And all this is the work of perhaps one railroad company or one railroad manager, or a number of them—it makes no difference.

"Has a railroad company the right to use its property for the purpose of destroying the property of other people? Is there no remedy for such evils?

"I think there is—a very simple one. If transportation lines between New York and Louisville can carry freight for 20 cents per 100, let them do it; don't prevent them, but let them carry freight from Syracuse to Louisville for a sum not exceeding 20 cents. Enforce this law regulating common carriers; not to make unjust discrimination against the transportation lines of the whole country, not only against the roads in one or more States, and these ruinously low competitive rates will, as a natural consequence, be abandoned, or, if they can be maintained, if they be reasonable in themselves, let the local rates be graded down accordingly."

"The people have either to be satisfied with all the evils of the transportation business, of which they have made such bitter complaints, and which they have so unsuccessfully attempted to remedy by state legislation, or they have to establish a judicious government over the railroads, compelling their proper management in the interest of the public without interfering with the legal property-rights of the owners of the road.

"Rates of transportation should be reasonable; they should be uniform and permanent, as nearly as the conditions of cost and the natural laws of competition permit; they should be alike to all parties situated alike, and should be properly adjusted, so as not to discriminate unjustly between different individuals or communities. To attain these objects under the present management of the competitive transportation business, is simply impossible. Intelligent co-operation between all the transportation lines which can influence the tariff, under a proper organization and regulations, becomes absolutely necessary. Whether this co-operation can be secured by the voluntary action of the transportation companies is doubtful."

"To establish, regulate and maintain with some degree of permanency the transportation tariff of this country, with its 70,000 miles of railroads and its many navigable rivers,

\*First Annual Report on the Internal Commerce of the United States, by Joseph Nimmo, Jr., pp. 88-91.

is not a problem that can be solved satisfactorily in the interests of the people, and in the interests of the proprietors of the roads, by the disjointed and separate action of the individual carriers, and by strife and warfare with each other. Combination and organization are absolutely necessary."

"This object can only be attained by the co-operation of the railroad companies under some sort of government, with sufficient power to regulate and restrain the action of individual companies so far as necessary for the welfare of the whole, and the attainment of the final object.

"As an important step toward the establishment of such a government, I propose that the Federal Government legalize (incorporate) organizations formed by the railroad companies upon the plan which I have described and for the purpose mentioned (of course under proper restrictions), and to make the action of the judicial and executive officers of the organization legally binding upon its members. Railroad companies would soon find it to their interest to form themselves into such associations, and transact their business with each other upon more correct principles than is now the case. When a number of such associations are formed they could be united again under a central organization, and thus a complete representative government of the whole railroad system of the country could be established, by which the intelligent management of this great property in the interest of the people as well as the interest of its proprietors, may finally be secured.

"A representative government, or self-government, established under the authority of the United States, over the railroad system, upon the theory and general plan here proposed, seems to me the proper solution of the railroad problem in this country."

"Objections have been made to the system of operations here recommended. It is said that the co-operation of competing transportation lines and consolidation of their interests are against public policy. Whether this be so or not, depends altogether upon the object and result of such co-operation. If it resulted in unreasonable transportation charges and extortion, such combinations should, indeed, not be tolerated; but if their object be to secure to the railroad companies reasonable compensation for their services, and to the public reasonable and permanent rates of transportation, then such combinations cannot be considered against public interest.

"It can be readily shown that the great evils of the transportation business arise chiefly from the strife and warfare between the transportation companies. This strife and warfare—generally called competition—possesses none of the legitimate elements of competition, but simply results from the want of proper management of an extremely intricate and complicated business, or from direct and gross mismanagement."

"There is nothing impractical in the Southern Railway and Steamship Association, except that it is a voluntary association. Make its operations legally binding upon all parties by proper legislative action, and the success of the association is secured. But, of course, the impractical part is that the Government or the people cannot be made to see the necessity of the organization for a proper government of the railroads in the interest of the people; they fear that such association will lead to abandonment of competition and to extortionate rates. The catchword 'combination' will be used against them.

"This is the mistake under which most people labor, and that erroneous view has first to be removed until government will sanction their associations; not only sanction them, but compel railroads to transact their business with each other upon the plan proposed. Legitimate competition will enforce its laws under the association as well as without it; it is the senseless, useless war of rates that is to be prevented. In the free intercourse of all interested railroad companies, each guarding its own interests and the interests of the communities it serves, the principle of competition is necessarily kept alive. Railroad combinations or associations take effect under governmental sanction. As I have proposed, the government reserves sufficient control to check and prevent every tendency toward monopoly or extortion and unreasonable rates of transportation."

"A clearing-house railroad association, on the plan of the Southern Railroad and Steamship Association, under governmental sanction, should include all roads; but if it does not, then there is no other remedy than the one you propose. In case of any one road making war, all the others have to follow. It is to avoid this that the intervention of government is wanted. But this interference is not to be direct, compelling the new road to make higher rates than it wishes to (in the case you suppose), but it is merely to force the new road to submit to the decision of an arbitration, or a court of appeals, any questions of difference it may have with the old roads.

"The interests of that new road are to be respected and guarded as well as those of the old. If that new road can afford to work for half the rates charged by the old ones, it ought not to be forced to make higher rates. The others will have to conform to such rates. But if the management of that road should make, temporarily, very low rates—war rates—in order to gain a certain object, or to injure other roads as well as itself, and thereby unsettle commercial business all over the country, with a view of afterward forming again combinations, and charging unreasonably high rates, then the arbitrators or court of appeals would decide against such a course, and remedy the cause for which the war is to be undertaken, by securing full justice to the new road. The government is not to interfere directly in this matter, except to give legal force to the decision of the arbitrators."

Without undertaking to definitely pass upon the degree of weight which should be given to these statements of the two sides of an important question, it is very apparent that the condition of affairs which Mr. Nimmo regards as permanent and upon the whole satisfactory, Mr. Fink looks upon as a passing phase of development, and an unsatisfactory phase at that. That "the weakest line determines the rates," is true; but it would also seem, from the experience of the past, that it will continue to determine them only so long as the stronger line does not see its advantage in absorbing it through lease, consolidation, or purchase. A railroad war which does not end in a consolidation of lines or in the absorption, through some process, of one line by another, is an indecisive war, and, judging by all recent experience, will almost inevitably be renewed, soon or late. That the absorption does not all take place at once, and that the combining process is not yet over, merely proves that all railroad, like other wars, are not decisive, and that great processes take time for their completion. So also it is true that the limits of local or non-competitive traffic are undergoing a steady contraction; but it is this very fact which has precipitated the recent destructive railroad wars. These, in their

\*Answers to inquiries in relation to the commercial movement between the Western and South Atlantic and Gulf States, the economy of transport on rail and water lines, and the competition between markets and between transportation lines, by Mr. Albert Fink, of Louisville, Ky., 1876. First Annual Report of the Internal Commerce of the United States, by Joseph Nimmo, Jr., Appendix No. 1, pp. 12-47.



turn, have then rapidly led to schemes of combination between the trunk lines, while the smaller independent lines have been forced to lose their identity in one or another of the contending systems. The consolidating and combining influences of the last ten years have, indeed, produced results not to be mistaken. There is certainly no reason to suppose that those influences will make themselves less felt in the next ten years than they have in the past ten, or that their tendencies will work in a different direction. If they do work in the same direction, it is difficult to see how they can result in anything except the survival of the fittest, until the number of those surviving is so small that a permanent confederation among them becomes practicable. This is clearly the condition of affairs to which Mr. Fink looks forward.

Nevertheless, the history of railroad development from the beginning has been little else than a constant succession of surprises. That which was most confidently predicted has rarely come to pass. It may well be, therefore, that in the present case those conditions which one class of observers regard as wholly transitional may by degrees be found to contain in them the elements of permanence; while, on the other hand, those indications which have led another class of observers to refer to events now taking place as "incidents in a phase of the process of development," may prove to have been mere surface movements, significant of nothing.

Meanwhile, the pooling combinations of railroads, whether they are going to result in anything more than they now are or not, do exist and do challenge the public consideration. That they have rapidly developed of late is apparent. That they may develop yet more in the immediate future, is very probable. They involve in their continued existence the whole question of competition between railroads; and, whether they are to grow into a system or not, the results, so far as the public are concerned, which may naturally be expected to flow from them, either in their present or their possible form, are well worthy of discussion.

Contrary to the general and popular conviction, this Board has always maintained that, so far from being necessarily against public policy, a properly regulated combination of railroad companies, for the avowed purpose of controlling competition, might prove a most useful public agency. The end in view has already been referred to, but will bear re-statement. It is nothing less than to reach a system in which the advantages of railroad competition, which all admit, may be secured; and its abuses, such as waste, discrimination, instability, and bankruptcy, be greatly modified if not wholly gotten rid of. In conducting its traffic, each combination of roads is now a law unto itself. It may work in concert with other combinations, or it may refuse to do so. It may make rates to one place, where it may think it for its interest for business to go, and may refuse to make them to another place where it is for its interest that business should not go. All this is essentially wrong. The business community of America, from one end of the country to the other, has been from the beginning so thoroughly accustomed to the extreme instabilities of railroad competition, that it has wholly lost sight of what its own interest requires. What it needs is certainly—a stable economy in transportation—something that can be reckoned on in all business calculations—a fixed quantity in the problem. This, of all results the most desirable, is now even looked upon with apprehension. There is an idea, the result of long habit, in the public mind, that so far as transportation is concerned prosperity is to be secured through a succession of temporary local advantages—an unending cutting of rates. The idea of a great system of internal transportation at once reasonable, equitable, and certain—permitting traffic to flow and interchanges to be made just how and where the interests of buyer and seller dictate—never discriminating—rarely, and then only slowly, fluctuating—this is a conception very far removed from the reality, and it may well be doubted whether it even commends itself when stated to the average man of business. He clings, on the contrary, to the burden of inequalities to which he is accustomed, and is inclined to doubt whether he could live without them. It has, however, already been pointed out that it was this result which the Granger movement sought to reach, and failed.

Undoubtedly the first step towards getting rid of the abuses of unhealthy competition, is to render the railroad system, throughout all its parts, amenable to some healthy control. The present competitive chaos must be reduced into something like obedience to law. Yet this can only be done, apparently, when the system is changed into one orderly, confederated whole. To attempt to bring it about during an epoch of wars, and local pools, and conflicts for traffic, would be as futile as it would have been to enact a code of laws, unsupported by force, for the government of the Scotch Highland clans in the sixteenth century, or a parcel of native Africans now. A combination or general confederation having some degree of binding force among all the railroad corporations might, therefore, not improbably prove the first step in the direction of a better and more stable order of things. But to lead to any results at once permanent and good this confederation or combination must, in three respects, differ radically from everything of the same sort which has hitherto preceded it: it must be legal, it must be public, it must be responsible.

Tried by this standard, it is safe to say that none of the pools or compacts now existing are consistent either with sound views of public policy, or have in them the elements of permanence. They are, in the first place, secret combinations of quasi public agencies; in the next place, they are in their objects and methods amenable to no law; and, finally, they are all in greater or less degree irresponsible even to public opinion. In addition to this, they fail even to accomplish the one result which, if practically brought about, might justify their existence—they do not afford to the community a reasonable and equitable system of charges for carriage, permitting an unchecked flow of travel and commerce, the continuation of which may with safety be calculated upon. A local and makeshift character is apparent in them all, and is not ignored even by those who are parties to them. Indeed, every disturbing element which has heretofore broken up other combinations is latent in those which have been described in this Report; the individuality of organization, the distinct separation of traffic, the armies of local freight agents, the extending of connections. While the processes of pooling are going on and during the very periods of truce, there is not a single considerable line in any one of the combinations which is not always anxiously looking about to strengthen itself in case of an ever-expected renewal of war. Under these circumstances—with no central organization or cohesive force—it is barely possible that all of the combinations which have been described should not fall to pieces at an early day. They will probably last only so long as the recollection of recent losses and the costly pressure of the last railroad war is fresh in the minds of stockholders and officials. Not improbably, also, their most valuable ultimate result will be found in the conception of something better and more permanent, implanted in the minds of those who own the railroad properties and those who operate them.

For the reasons which have been given, the plan of railroad confederation brought forward by Mr. Fink in the extracts which have been quoted, though doubtless susceptible of many improvements, is certainly a great advance on any

solution of the railroad problem which has yet been suggested. It is at once far more philosophical, more practical, and more in consonance with American political usages and modes of thought. Indeed, it is not easy to point out any respect in which it might not fairly be accepted as the natural and logical outgrowth of American railroad development, as it has gone on up to this time. This is far more than can be said of any other solution of the problem which has yet been suggested. The difficulty, indeed, with all of these has been that they disregarded what had gone before; they were none of them in the nature of a logical sequence or natural outgrowth. Those who originated them sought to deal with a vast and complicated system as if it were so much plastic material, to be handled and shaped at will. Both the scheme for the State ownership of railroads, and the measures of Granger legislation failed and were abandoned, for this reason—they were not sequences; and while the first could not stand the test of discussion, the last broke down in practice. The idea of regulating all railroads through the State ownership of one—the Belgian system—was some years ago brought forward, and urged on legislative attention by this Board, as at least worthy of careful inquiry. Subsequently it was examined into by the corporators of the Boston, Hoosac Tunnel & Western Railroad Company, one of whom was also a member of this Board, and the practical difficulties and objections, both political and financial, which presented themselves were of such a nature that the corporators unanimously found themselves compelled "by the logic of their investigations, regardless of preconceived theories," to another result.

Irresponsible and secret combinations among railroads always have existed, and so long as the railroad system continues as it now is, they unquestionably always will exist. No law can make two corporations, any more than two individuals, actively undersell each other in any market if they do not wish to do so. But they can only cease doing so by agreeing in public or in private on a price, below which neither will sell. If they cannot do this publicly, they will assuredly do it secretly. This is what, with alternations of conflict, the railroad companies always have done, in one way or another; and this is what they are now doing and must always continue to do, until a complete change of conditions is brought about. Against this practice, the moment it begins to assume any character of responsibility or permanence, statutes innumerable have been aimed, and clauses strictly interdicting it have of late been incorporated into several State constitutions. The experience of the last year, if it has proved nothing else, has conclusively demonstrated how utterly impotent and futile such enactments and provisions necessarily are. Starting, then, from this point; accepting what is, and what must continue to be, Mr. Fink simply proposes to legalize a practice which the law cannot prevent, and, by so doing, to enable the railroads to confederate themselves in a manner which shall be at once both public and responsible. He represents more especially, in the discussion, the railroad side of the question. The other side of the question—that of the public—admits of a statement equally clear. Its essential point, however, is that, through this process and this process only, can the railroad system as an organized whole be brought face to face with any public and controlling force, whether of law or public opinion. Once let the railroad companies confederate in accordance with law, and the process through which this all-important confronting result would be brought about is apparent. The confederation would be a responsible one, with power to enforce its own decisions upon its own members. The principles upon which it could act, as a creature of the law, would be formulated in the law. It could compel obedience, but obedience only to legal decrees, and the question in each case would be whether the decree was legal. Then, at last, the correct principles governing railroad traffic would be in course of rapid development. The essential features of what constitutes discrimination and extortion would gradually be formulated into rules, and the moment that is accomplished competition will work equitably. This result must follow. It must follow from the fact that competition is now almost entirely local, and hence discrimination necessarily results from it. That is, a rate to or from one point in no way necessarily affects rates to or from other points—a local variation does not cause the whole schedule to move up or down. This is what makes discrimination. Could the system be confederated and equalized, however, such would not be the case. An established tariff, intended to be public and permanent, would then have to be fixed upon, just as it is to-day fixed upon in each of the local pools which have been described. This tariff, however, would, of necessity, fluctuate throughout under the pressure of competition at any one point. For instance, a lake rate to be met at Chicago would affect the land rate from Louisville; if it did not, one point would be discriminated against, as it now perpetually is, in favor of the other. Thus the principle of the all-pervading action of competition would be established throughout a confederation, as it is locally established through combinations to-day. In this way, full effect would be given to that natural and healthy competition which is now so successfully localized, while railroad discrimination would be effectually repressed. Discrimination being thus disposed of, it would then only remain to guard against extortion. That would not, apparently, be difficult. In the first place, it would probably be found that the effect of natural competition would, once the play of its forces was made all-pervading, afford the necessary protection. If it did not, the extortion would have to be practiced in a public manner, and by a responsible agent, upon whom the whole force of public opinion might and would be directed. Should this fail, the central agency being responsible to the law as well as to public opinion, recourse could finally be had to legislation. Beyond this, it does not seem worth while to carry the discussion. Points of detail must be settled as they arise, if they ever do arise. At present the question is not ripe for solution, and no immediate practical measure is proposed. The first step is, necessarily, to accustom the public mind to the idea that railroad combinations possibly may be an evil only because they are unrecognized, and that the proper way to deal with them may, perhaps, be through regulation and not through prohibition.

Meanwhile, so far as the local interests of Massachusetts are concerned in these general questions, the members of this Board have nothing to add to the view expressed in their last annual report [Eighth Report, pages 57-60]. The great struggle between lines representing different seaboard cities for a control of the foreign business was then just drawing to a close. The basis of adjustment finally arrived at seems to have worked satisfactorily, and will not probably be disturbed. It was, as usual, a compromise. On the one hand were the lines running between the West and New York, which demanded that an absolute equality should be recognized in rates between central interior points and the great seaboard termini; while, on the other hand, the lines to Philadelphia and Baltimore claimed that an allowance should be made to those points, because of their shorter distance from the West, and the line to Montreal insisted that a similar allowance should be made on shipments through Montreal on account of its longer distance. The result of the struggle was that a slight differential rate was allowed to Baltimore and Philadelphia, amounting, in the case of shipments from Chicago, to one and two cents a bushel respectively. The difference against Boston was five cents, subject to a drawback of

the entire amount on all foreign shipments. As respects the West and the through railroad system of the country, the condition of affairs, so far as Massachusetts is concerned, does not, therefore, seem to be in any respect essentially different from what it has been during the last five years. The opening of the Tunnel line has, as yet, been productive of no perceptible results. Indeed, it is not easy to see what results it could produce, so long as it is limited at its western terminus to a connection with the same line with which the Boston & Albany road already connected before the tunnel was opened. Not until the last-named line effects a connection with lake navigation at some point on Lake Ontario, on the one side, and with the Erie road, at Schenectady, on the other, can any considerable results inure from its completion. This subject, however, has already been elaborately discussed in official reports by this Board and by others, and during the past year certainly nothing has occurred to cause any doubt of the correctness of the views heretofore expressed. As full information in regard to the steps now being taken to complete the Tunnel line and make it an effective agency in the through railroad connection of Massachusetts will, doubtless, be submitted by those upon whom the care of the Commonwealth's interest in that line has been more directly imposed, it is unnecessary, in the present report, to enter upon the subject.

CHAS. F. ADAMS, JR.  
FRANCIS M. JOHNSON.  
ALBERT D. BRIGGS.

BOSTON, Dec. 14, 1877.

#### Preserving Drawings of Railroad Improvements, Patented and Unpatented.

The following is the first part of the report of the Western Railroad Association for the year 1877, as submitted to the meeting in Chicago, Jan. 8:

There is one respect in which the members of the Association do not take advantage of one of its most important and valuable benefits, to which we desire to give the most prominent place in this report.

For reasons given below, we earnestly recommend that every member that has not already done so should immediately issue the equivalent of the following circular letter, and that the officer issuing same should refer to the Association all reports received pursuant thereto.

[Circular from F. de Funiak, Chief Engineer and Superintendent Machinery, Louisville & Nashville and South & North Alabama Railroads, dated Louisville, Ky., June 21, 1877.]

"In view of the enormous recoveries which courts have given for the slightest infringements of patents, it becomes necessary that every improvement of any value at all, which parties in the mechanical or road departments may make in any of the tools, machinery or devices of any kind, be thoroughly investigated to ascertain whether it is already patented or not.

"Apparently trifling improvements have been and are being patented, and claims are constantly coming in for patent infringements. The use of any patented appliance makes the company liable for damages, and from this on, all officers and employees of this department will use no new device or improvement, no matter how trifling, without first submitting the same to me with full description and drawings, so that I may be enabled to find out if the improvement has been already covered by some existing patent, and if not, to get it patented, if it is of any value."

Four illustrations will demonstrate the purposes of this recommendation and the necessity for such action, and the first one will explain what is now understood by few, namely that one patent may be perfectly valid and yet infringe a prior patent.

First. The Association is defending for its members suits involving millions of dollars, for the alleged infringements of patents by devices which have been once bought, and a patent royalty for which has been once paid. In many instances, the royalties paid were well paid, the patents under which they were paid being valid. But in some of these same instances, the devices thus put in use are covered in some of their parts or elements by other patents which were not paid for, and for the infringement of which, by these same devices, this enormous litigation has ensued.

Suppose A is the first to invent a water leg or hollow inverted arch in a locomotive furnace, and patents it. B improves it by inserting two or three holes in it to allow the ashes and cinders to pass back into the fire, and patents his improvement; C still finds difficulties concerning the combustion chamber thus formed, and he invents the remedy by adding the following elements, viz.: That the arch must have a certain pitch toward the furnace door, must be detached a certain distance from the flue sheet, and hollow staybolts must be used, the holes of which must have an aggregate area which shall bear a certain relation to the area of the grate surface, and he patents these additional elements. C then presents his patent, which shows in its specifications and drawings all the parts of what is now believed to be the most perfect arrangement of the combustion chamber in a locomotive furnace, and D (the manager of a railroad company) buys a license from him, paying him all the consideration he thinks he can afford to pay for the use of such an arrangement; but is surprised, after years of use, that he must also pay A and B for the elements which they have invented. A, B and C have, in the case supposed, each valid patents, yet B's patent infringes A's, and C's patent—the practical device which goes into general use—infringes both A's and B's.

This is a plain case in which it is barely possible, but not probable, that D, being somewhat versed in construing patents, would ascertain from an inspection of the claims of the patent presented (C's) that it infringed the prior patent, and would provide then for the difficulty, instead of running headlong into it.

In a large proportion of cases, however, the parties in interest are not competent to decide the patent relations of a device which it is desired to use, without the aid of a skilled patent attorney. Such aid the Association furnishes on request of its members.

Second. An actual case. The owner of a patent on an alleged improvement in car couplers presented same to a member of the Association, who was pleased with it. After experimenting with it for a time, the railroad manager, calling for the owner's title, was shown a certified copy of a patent, describing and showing all the parts of the coupler; whereupon he paid for it several hundred dollars. The transaction closed, the money paid, and a number of cars equipped with the coupler, the manager submitted the case to the Association for a report, which he received, not in the following language, but to the following effect: "First. The device which you have put in use, though partially described in the patent for which you have paid, is not in any of its parts claimed therein or covered thereby. Second. This patent is not valid for the thing that is claimed therein, and the money paid is worse than wasted, for—Third. By the use of the device introduced you become liable to five other patents, to each of which you will probably have to account if you continue this use."

If such devices and patents are presented at the proper



time for reports, such unwarranted payments, and getting and continuing in such difficulties, can be avoided with reasonable certainty. The only difference between this actual case and many others which have occurred is, that the others have not been presented with as much promptness.

Third. A sample of many cases. The owner of a patent presents a request from a member of the Association, against whom claim is made, for a report upon same, and is not only advised, but satisfied, that his patent is invalid, and his claim unfounded. Whereupon he does not annoy the members of the Association who are accustomed to refer all such matters for reports, but prefers a claim for \$100, \$250, or, if the company will stand it without a reference to the Association, \$300, against another company which will pay "such small amounts rather than be further annoyed in the matter," "especially as it appears to be a plain case;" when the simple announcement to the claimant that the matter would be investigated on the road, a report sent to and an opinion received from the Western Railroad Association, and an answer returned to him in the due course of business, would be the last the company would ever hear of the claim.

Fourth. Another actual case. A master mechanic, in the course of his employment upon one of the Western roads, made several minor improvements in the machinery and devices used. He did not patent them, partly on the theory that his time and ability, and the fruits thereof, belonged to his employers, and partly because the improvements were not, in his opinion, of sufficient importance that the government should award him a monopoly upon them. He did, however, with some pride, show two of them to a visitor one day. Some time after, being in the office of an Eastern railroad company, he found his visitor trying to sell rights under patents covering these identical improvements, which the visitor had stolen from the master mechanic's trestle-board. In this instance, by a happy accident, the perpetration of the fraud was prevented.

This seems sufficient to show the importance, in the language of Mr. de Funiak's circular, of "getting it patented if it is of any value."

The Association will, upon request, and without cost, inform its members with reasonable certainty how many and what patents cover any part or all of any device submitted; whether any patent submitted be valid, and for what; whether any claim preferred should be recognized, and to what extent (and if yea, and if so instructed, will settle the claim with better results in most instances than can be attained by the company against which claim is made), and whether any improvement heretofore or hereafter made on a road is patentable.

These reports to members depend largely in their preparation upon the special points submitted. In most cases a report "upon the state of the art" is compiled by our Washington correspondent, from the Patent Office records and the public libraries at Washington. In many cases reports are taken from the master mechanics and master car-builders of the roads in the Association; in all cases the opinion given is prepared by or submitted to the attorney.

A large number of such reports have been given to members during 1877. During 1878 twice as many will be furnished, if the members make available their privileges in the Association.

There are two kinds of work, namely, soliciting patents, and determining the mechanical merits of recent improvements, and one kind of eminent ability, namely, the services of a professional mechanical engineer, which have been suggested as proper additions to the work of the Association.

The Association does not undertake to solicit patents. Reports can be had as to whether unpatented improvements, or what parts thereof, are patentable, and if specially requested the Secretary will attend to securing patents thereon, charging the company, for the services of a solicitor at Washington, the extra cost over and above the report above alluded to.

We earnestly recommend that all improvements made upon the roads in the Association be reported in full, with drawings, and when the improvement is of value, with a model, to our office, with a statement as to who was the inventor thereof, and whether he intends patenting same. The describing fully in a printed publication of any of the improvements made but not patented by railroad employees would, in most instances, prevent their being patented by others. The officers of the Association will see that such publication is made, upon the proper devices from any of its members.

It has been suggested several times during the last few years that the Association should undertake, through committees and experiments, to determine the mechanical merits and relations of the several prominent improvements in use and desired to be used. The suggestions have been made by members without much deliberation as to the details of carrying them out, and the officers of the Association have felt that they should be fully considered and acted upon by the members before taking steps to give them shape. A considerable number of patented devices are tried and bought by companies, which would not be looked at if they knew of other devices which either are open to the public or can be bought for the same or a less amount.

The great reduction which has taken place in the last decade in transportation charges has been due largely to the improvements in machinery and appliances which have been from time to time introduced. It is also a fact that a considerable proportion of the amounts paid for these improvements have been absolutely wasted.

It has been suggested that the offices of the Association should, without expense to the Association, be furnished with models and complete descriptions of all the modern devices in use upon roads, and the more prominent of those proposed to be used, and that careful experiments should be made with such devices deposited with the Association, as committees upon their various classes, appointed at the annual meetings, should direct, under the supervision of a competent and impartial mechanical engineer, whose exclusive services should be fairly compensated and exclusively commanded by the Association. For the reasons that such a procedure would necessitate an addition, at considerable cost, to the service of the Association, and that the above suggestions come to your committee so late in the year, we have but this recommendation to make, namely, that they, with the following considerations concerning the employment of a mechanical engineer, be fully considered by the annual meeting, and be referred, with such powers and directions as shall then be enacted, to the Board of Directors then elected for next year.

In giving opinions upon questions submitted, whether certain devices in use, or desired to be used, infringe any patent, or whether certain devices are properly covered by the claims of certain patents, the mechanical operation and the results of the devices form important and essential features. The opinion of a professional mechanical engineer, especially educated in railroad devices, would be of value in almost every case arising, and would make the service of the Association perfect and complete. While the exclusive services of such a person would be of evident value in this regard, we are of opinion that it would be hardly advisable to provide therefor, unless experimentation and examinations to determine the mechanical merits of devices submitted were also contemplated.

We think that these two matters are worthy of serious consideration by the Association.

#### The Iowa Governor on Railroads.

Governor Newbold, of Iowa, in his message to the Legislature, read Jan. 15, said:

The right of the law-making power to regulate railroad tariffs has been sustained by the highest judicial tribunal of the land, and sustained, too, not merely because of the ample reservations made in the land-grant and other acts of our legislatures, but on broader principles—such, indeed, as are essential to well-ordered governments; and I cannot but think that corporate rights are more securely guarded today by reason of this decision than if the determination of the disputed question had been otherwise. In bringing about this result the State of Iowa has had, as it were, the leadership, the masterly arguments of its late Attorney-General apparently pointing the way to the decision. The matter of authority having been divested of doubt, the consideration of the tariff question may now be had freed from much of the acrimony attending previous discussions of the subject. I see no good reason for the entire repeal of the law. I am aware that it is argued that its retention has the effect to deter capital from investing in railroads in Iowa. This may be, but I do not find that the absence of such a statute has had the effect to hasten more rapidly the construction of railroads in neighboring States. I find that during the years 1874, 1875 and 1876 the increase of railroad mileage in Iowa was greater, both absolutely and relatively, than in either of our sister States on the north and west, while those of our neighbors that showed most decided increase were Illinois and Wisconsin, both having laws regulating railroads. Nevertheless, I believe it right that a thorough examination be had into the working of the details of the law, and such modifications made therein as may seem for the best interests of the people and the railroads.

#### Train Accidents in December.

The following accidents are included in our report for the month of December:

##### REAR COLLISIONS.

On the morning of the 1st a passenger train on the Grand Trunk road ran over a misplaced switch at Belleville, Ont., and into a freight car standing on a siding. The engine was damaged, the freight car wrecked and four cars of the passenger train much broken. One passenger was badly hurt.

On the night of the 1st a car broke loose from a construction train on the Utah Northern road, near Franklin, Idaho, and afterwards ran into the rest of the train. Two cars were wrecked and two laborers injured.

On the 4th a freight engine in the Boston & Albany yard at West Springfield, Mass., ran into another, damaging the tender.

On the 4th, as a freight train on the Pittsburgh, Virginia & Charleston road was backing into a siding at West Elizabeth, Pa., it struck some coal cars, and the caboose and one freight car were thrown over and damaged.

On the 6th a freight engine ran into the rear of a switching engine in the Chicago, Burlington & Quincy yard at Ottumwa, Ind., doing some damage.

On the morning of the 8th a freight train on the Erie Railway ran into the rear of a passenger train which was stopping at Greenwood, N.Y. The rear car was badly broken and one passenger slightly hurt.

On the afternoon of the 9th a passenger train on the Cleveland, Columbus, Cincinnati & Indianapolis road ran into the rear of a freight train near Shelby, O., doing some damage. The accident was caused by the misplacing of a switch, which threw the passenger train over upon the siding where the freight was.

On the morning of the 11th a freight train on the New London Northern road ran over a misplaced switch and into some empty cars which were standing on a siding at Palmer, Mass. The engine was damaged, two cars wrecked, and several others slightly broken.

On the morning of the 12th the second section of a coal train on the Pennsylvania Railroad ran into the rear of the first section near Loyalhanna, Pa., breaking the engine and five cars badly. There was a thick fog at the time.

On the morning of the 15th a freight train on the Baltimore & Ohio road ran into another freight which was standing on the track at Chicago Junction, O., damaging several cars, killing a brakeman and injuring the conductor.

On the afternoon of the 15th an engine on the Central Railroad of New Jersey, which had just cut loose from a coal train in Elizabeth, N.J., was stopped while some trackmen removed a rail which projected over on the track. The engine and fireman got down to help, when the detached cars, which were still moving slowly, struck the engine with force enough to jar open the throttle, and it started down the track at great speed, with no one on board. It ran down the track some two miles and into the yard at Elizabethport, where it struck an engine standing on the track. Both engines were completely wrecked and a brakeman, who was on the engine in the yard, was crushed to death.

On the 17th a passenger train on the Pittsburgh, Cincinnati & St. Louis road ran into the rear of a wood train near Lawndale, Ill., doing some damage.

On the night of the 17th a construction train on the Quebec, Montreal, Ottawa & Occidental road ran into the rear of another construction train near Batiscan, P.Q. Eight cars were wrecked, one man killed and three others badly hurt.

Early on the morning of the 21st an express train on the Michigan Central road was stopped by a freight train which had stalled on a grade near Michigan Centre, Mich. While trying to help the freight up the grade another freight came up and ran into the express, damaging the rear car. There was a fog at the time.

On the 21st a freight train on the Erie Railway ran into the rear of a preceding freight, which had stopped near Warsaw, N.Y., to avoid some cars which had broken loose from another train. An engine and a caboose were badly broken and a brakeman hurt.

On the afternoon of the 25th a freight train on the New York Central & Hudson River road ran into the rear of a local passenger train, which had stopped at Coldwater, N.Y., damaging the rear car. The local train had sent no signal back, though there was a thick fog at the time.

##### BUTTING COLLISIONS.

On the morning of the 3d, on the Grand Trunk road at the Tanneries Junction in Montreal, P.Q., there was a butting collision between a freight train and a switch engine, by which both engines were badly damaged.

Early on the morning of the 14th a coal train on the Erie Railway broke in two near Middletown, N.Y., and the detached cars ran back down the grade and into the head of a following train, damaging the engine and wrecking several cars.

On the evening of the 17th four cars of an oil train on the Erie Railway broke loose in Paterson, N.J., and ran back down grade into the head of a following freight train. The caboose was wrecked and the oil cars were thrown over, the oil catching fire. The cars were completely destroyed, the ties burned for some distance and the rails badly warped and twisted. The burning oil ran down the bank and through a culvert into a partly open sewer, whose course it followed

into the Passaic River. Several buildings near the track were set on fire, and at one time the river was covered with a sheet of fire for some distance. One of the oil tanks exploded and scattered the oil to a considerable distance. Fortunately the engine of the second train was not disabled, and that train was backed out of reach before the fire began to spread.

On the evening of the 22d, in West Quincy, Mo., there was a butting collision between a St. Louis, Keokuk & Northwestern and a Hannibal & St. Joseph freight train, by which both engines were slightly damaged.

On the afternoon of the 26th there was a butting collision between an express passenger and a freight train on the Union Pacific road, near Cheyenne, Wyo. Ter. Both trains were running slowly, but there was a dense fog at the time and the trains did not see each other until close together. The freight engine and one car were badly wrecked, the express engine and one car much damaged; the freight fireman killed, the engineman so hurt that he died in a few hours, and the express engineman less severely injured. It is said that the dispatcher should have held the express at Cheyenne.

##### UNEXPLAINED COLLISION.

On the morning of the 24th, at St. John's, P.Q., there was a collision between a Grand Trunk freight train and a Vermont Central train, by which several cars were wrecked and an engineman hurt.

##### DERAILMENTS, BROKEN RAIL.

About noon on the 7th, a passenger train on the Vermont Valley road was thrown from the track by a broken rail in the yard, at Bellows Falls, Vt. The engine upset, and was badly damaged.

On the morning of the 20th a coal train on the Philadelphia & Reading road struck a broken rail near Limerick, Pa. The engine was badly broken, and nearly 40 coal cars were piled up in a very bad wreck.

On the morning of the 29th a rail broke under a passenger train on the Grand Rapids & Indiana road, near Pierson, Mich., and the rear car was thrown from the track. The car was dragged some distance over the ties, when the coupling broke, and it upset down a bank. Six passengers were hurt, and several others bruised slightly.

##### DERAILMENTS, DEFECTS IN TRACK.

On the morning of the 9th the engine and two cars of an express train on the Wabash Railway, were thrown from the track at Cerro Gordo, Ill., by a broken switch rod. The cars were badly damaged and two trainmen slightly hurt.

##### DERAILMENTS, BROKEN AXLE.

On the 6th an axle broke under a car in a freight train on the Philadelphia & Atlantic City road, near Da Costa, N.J., and four cars were thrown from the track and upset, doing much damage to cars and freight.

On the morning of the 11th an axle broke under a coal car in a train on the Pennsylvania Railroad, near Torrington, Pa., and five cars were thrown down a bank and wrecked.

On the evening of the 11th, near Westfield, Mass., an axle broke under a car in a freight train on the Boston & Albany road, and eight cars were thrown from the track, one of them being badly wrecked. The track was blocked four hours.

On the morning of the 12th an axle broke under a car in a freight train on the Pittsburgh, Cincinnati & St. Louis road, near Urbana, O., and five loaded cars were piled up together in a bad wreck, blocking the road several hours.

On the afternoon of the 13th an axle broke under an oil car in a train on the Pennsylvania Railroad, near Hawkins, Pa., throwing the car from the track and delaying trains for a time.

On the afternoon of the 18th a freight train on the Ohio & Mississippi road was thrown from the track near Lebanon, Ill., by the breaking of an axle under the engine. The road was blocked two hours.

On the morning of the 30th an axle broke under a car in a freight train on the Chicago, Rock Island & Pacific road, near Peoria, Ill., and 14 cars were thrown from the track and piled up in a bad wreck.

##### DERAILMENT, BROKEN BRIDGE.

On the afternoon of the 6th a bridge on the Chicago, Rock Island & Pacific road, near Perrin, Mo., gave way under a freight train. The engine went down and two cars were piled up on top of it.

##### DERAILMENTS, SPREADING OF RAILS.

Near noon on the 7th a car of a passenger train on the Buffalo & Jamestown road was thrown from the track near Dayton, N.Y., by the spreading of the rails.

On the morning of the 10th a train on the Indianapolis, Cincinnati & Lafayette road was thrown from the track near Acton, Ind., by the spreading of the rails, blocking the road three hours.

On the morning of the 15th the baggage car of a passenger train on the Addison Branch of the Rutland road ran off the track near Orwell, Vt. The car upset and was damaged. The accident was caused by the spreading of the rails.

On the night of the 26th the engine of a passenger train on the Atlantic & Great Western road was thrown from the track by the spreading of the rails on a curve near Jamestown, N.Y.

On the night of the 29th the engine of a passenger train on the Houston & Texas Central road was thrown from the track near Mexia, Tex., by the spreading of the rails.

##### DERAILMENTS, CATTLE.

Very early on the morning of the 6th a passenger train on the Missouri Pacific road ran over a cow near Atchison, Kan., and several cars were thrown from the track, blocking the road seven hours.

On the evening of the 17th a coal train on the Lehigh & Susquehanna Division of the Central Railroad of New Jersey struck a cow near Lehigh Gap, Pa. The engine and several cars were thrown from the track down a bank and were wrecked, killing the engineman and injuring the fireman badly.

On the morning of the 27th a passenger train on the Davenport & Northwestern road ran over a steer near Davenport, Ia., and three cars were thrown from the track, blocking the road all day.

##### DERAILMENTS, ACCIDENTAL OBSTRUCTION.

On the afternoon of the 4th a coal train on the Philadelphia & Reading road ran off the track at Lost Creek, Pa., and 20 cars were piled up in a bad wreck, the depot building being almost demolished as well as the cars. Three trainmen were hurt slightly. The accident was caused by a large stone which had rolled upon the track.

On the 7th some cars of a wood train on the Savannah & Charleston road were thrown from the track near Coosa-hatchie, S.C., by a stick which fell from a car upon the rails. The road was blocked several hours.

About noon on the 18th, a brake-beam dropped on the track from a car in a coal train on the Erie Railway, in Port Jervis, N.Y., throwing eight cars from the track.

On the evening of the 17th a freight train on the Boston & Albany road struck a rock which had rolled upon the track in a deep cut near Chester, Mass. Several cars were piled up in the cut and wrecked, making an obstruction very



difficult to clear, owing to the narrowness of the cut. The road was blocked all night.

#### DERAILMENTS, MISPLACED SWITCH.

On the afternoon of the 3d the engine of a passenger train on the Delaware, Lackawanna & Western road was thrown from the track by a misplaced switch in Newark, N. J., delaying the train a short time.

On the morning of the 13th a passenger train on the Chicago, Milwaukee & St. Paul road was thrown from the track by a misplaced switch in La Crosse, Wis. The engine was badly damaged, the truck breaking and all the link motion being bent and twisted; the engineman was slightly bruised.

Near noon on the 22d a passenger train on the Indianapolis & Vincennes road was thrown from the track by a misplaced switch in Indianapolis, Ind., doing some damage. It is said that a track hand at work near by saw the train coming and hastened to change the switch, thinking that it was wrong, and thus threw the train off.

On the evening of the 23d a passenger train on the New York Central & Hudson River road was thrown from the track by a misplaced switch in the yard at Niagara Falls, N. Y., and the engine upset, blocking the road all night.

On the evening of the 24th a passenger train on the Chicago, Burlington & Quincy road struck a misplaced switch in Council Bluffs, Ia., and the engine and baggage car left the track, the engine turning over on its side.

On the 29th the engine of a passenger train on the Boston, Clinton, Fitchburg & New Bedford road was thrown from the track by a misplaced switch close to a bridge in Clinton, Mass. The guard rails, however, held the engine to the track, and the train passed over the bridge safely.

#### DERAILMENT WITH MALICIOUS INTENT.

On the morning of the 31st the engine and one car of a passenger train on the Missouri, Kansas & Texas were thrown from the track at Deerfield, Kan., by a misplaced switch. The engine was somewhat damaged. The switch is said to have been purposely misplaced.

#### DERAILMENTS, UNEXPLAINED AND MISCELLANEOUS.

On the afternoon of the 1st the engine and three cars of a freight train on the Philadelphia & Reading road ran off the track at Rausch's Station, Pa., and went down a bank.

On the 2d several cars of a freight train on the Nashville & Decatur road were thrown from the track at Brown's Road, Tenn., and wrecked.

On the night of the 2d the engine and several cars of a freight train on the Baltimore & Ohio road ran off the track at Marriottsville, Md., wrecking some of the cars and tearing up the station platform.

On the 3d a gravel train on the Lake Erie & Louisville road ran off the track near Fostoria, O., and was badly wrecked. The conductor was killed.

On the evening of the 5th several cars of a coal train on the Erie Railway ran off the track at Otisville, N. Y., and both tracks were blocked two hours.

On the morning of the 6th two cars of a freight train on the Delaware Railroad ran off the track at Genn's Crossing, Del., blocking the road some time.

On the afternoon of the 7th a car of a freight train on the Kansas Central road ran off the track and upset in Winchester, Kan.

On the morning of the 13th a freight train on the Syracuse Division of the Rome, Watertown & Ogdensburg road ran off the track near Pulaski, N. Y., and 11 cars were wrecked. A brakeman was killed.

On the morning of the 14th a freight train on the Kansas Central road ran off the track near Holton, Kan.

On the 14th some cars of a freight train on the Fort Wayne, Jackson & Saginaw road ran off the track near New Era, Ind., and one was badly wrecked.

On the morning of the 17th the engine of a Jeffersonville, Madison & Indianapolis freight train ran off the track on the Union tracks in Indianapolis, Ind.

#### BOILER EXPLOSIONS.

On the night of the 19th a shifting engine on the Western Railroad of Alabama exploded its boiler while running through the yard at Columbus, Ga. It is said that there was only 95 pounds of steam on at the time.

On the afternoon of the 26th the engine of a freight train on the Low Grade Division of the Allegheny Valley road exploded its boiler when near Pennfield, Pa., wrecking the engine and injuring the engineman and fireman badly. The engine had been out of the shop only a few months.

This is a total of 66 accidents, whereby 8 persons were killed and 26 injured. Seven accidents caused the death of one or more persons; ten resulted in injuries less than death, while 49, or 74.2 per cent. of the whole number, caused no injuries serious enough for record.

These accidents may be classed by their nature and causes as follows:

COLLISIONS:	
Rear collisions.....	16
Butting collisions.....	5
Unexplained.....	1
DERAILMENTS:	
Unexplained.....	11
Broken rail.....	3
Broken switch rod.....	1
Broken axle.....	7
Broken bridge.....	1
Spreading of rails.....	5
Cattle on track.....	3
Accidental obstruction.....	4
Misplaced switch.....	7
Boiler explosions.....	42
Total.....	66

Three collisions were caused by misplaced switches; three by trains breaking in two; two by fog, and one each by a runaway engine, by failure to use signals and by a mistake in orders. There were 23 accidents traced directly to defects or failures of road or equipment. Seven collisions were between a passenger and a freight, and 15 between freight trains; 18 derailments were of passenger and 24 of freight trains, and the two other accidents were both to freight trains.

It may be noted that in the 22 collisions five persons were killed and 11 injured; the 42 derailments killed three and injured 13 persons, while in the two boiler explosions two men were hurt.

As compared with December, 1876, there is a decrease of 22 accidents, of 86 killed, and of 115 injured, but the month last year was marked by the Ashtabula disaster, which accounts for the great difference in killed and injured.

The month's record is a fresh illustration of the close connection between the weather and railroad accidents. The month was everywhere distinguished by the unusually mild

and pleasant weather; there were but one or two very cold days and very few storms, and accordingly we find but few of the accidents usual at this season. There were few broken rails, no accidents resulting from snow and a shorter record than we have had for several months past, the only exceptional case being an unusual number of broken axles. In one respect there is a better showing than usual; there was but one accident purposely or maliciously caused. In another, however, the record is not a good one, for nine accidents—six derailments and three collisions—caused by misplaced switches certainly show a discreditable, almost a disgraceful degree of carelessness in that respect. The number of butting collisions is unusually small, and the number of killed and wounded the smallest for nearly a year.

For the year ending with December the record is as follows:

	No. of Accidents.	Killed.	Injured.
January.....	147	10	148
February.....	56	5	41
March.....	58	9	31
April.....	60	13	34
May.....	46	12	41
June.....	49	16	92
July.....	53	21	144
August.....	98	46	229
September.....	84	20	88
October.....	82	31	112
November.....	83	23	70
December.....	66	8	36
Totals.....	891	214	1,047

The averages per day for the month were 2.13 accidents, 0.26 killed, and 0.84 injured; for the year they were 2.44 accidents, 0.59 killed, and 2.87 injured. The average casualties per accident were for the month 0.121 killed and 0.394 injured; for the year 0.240 killed and 1.175 injured.

## Contributions.

### The Tariffville Disaster.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Once more the community has been shocked by one of those terrible calamities, to which by common consent the misnomer "bridge accident" is applied.

On the 15th inst., the 9:30 p. m. special on the Connecticut Western Railroad, consisting of two passenger engines and eleven cars, was precipitated into the Farmington River, by the failure of a bridge one-half mile beyond Tariffville and 12 miles west of Hartford.

Thirteen persons were killed outright, and thirty-five more or less seriously injured. One engine, one baggage car and three passenger coaches completely wrecked, another engine badly damaged, travel interrupted, rolling stock seriously crippled and a batch of lawsuits looming up in the near future are the consequences to the railroad company.

The ill-fated bridge was built in 1871 by Briggs & Co., of Springfield, Mass., and consisted of two equal spans—Howe truss pattern, through bridge:

Clear span.....	163 feet.
Height of truss.....	20 feet.
Panel length.....	10 feet.
Width in clear.....	14 feet.
Skew angle.....	30°

Lower chord, 13 x 26 in.; upper chord, 11 x 26 in.; struts, 9 x 22 in.; counters, 8 x 7 in., all of yellow pine. Cast-iron angle blocks, wooden track-strings and floor beams, and wrought-iron tie-rods, three of 1½ in. diameter in the 12 end panels, and two of 1½ in. diameter in the four centre panels.

Failure occurred in the second span, and particular attention is here called to the condition of this span and the positions of the different parts of the wreck as hereafter described, as furnishing the premises for the conclusions in regard to the point of failure and its causes.

The general direction of the structure being east and west the east span will be designated as the first, and the west span as the second span, and the two girders as north and south girder respectively.

Of the second span the entire south girder fell with the train, carrying with it also the adjacent vertical end-post of the first span, and a short piece of its upper chord; of the north girder there remained standing, after the wreck of its east or pier end, six panel lengths of its upper and five panel lengths of its lower chord, with intermediate struts, counters and tie-rods.

The wrecked engines and cars are all lying to the south of the centre line of the bridge, and in the following positions, viz.: The first engine on the west shore, just south of the abutment, and parallel to the track, rear end forward and on its back. The second engine lies next to the shore in the river, right in front of the abutment, turned over on its left side. This engine just struck the abutment and then fell into the river; next comes the baggage car, which evidently had a clear fall to the ice below, lying completely wrecked, in line with the bridge. The first passenger coach in striking it swung around and lies at almost right angles to the bridge; the second coach at an oblique angle to the bridge and its rear end close to the pier; while the third coach lies with its forward end in the river pointing southward, and its rear end high and dry on the top of the pier. The rest of the train remained standing on the first span.

The remnants of the north girder, taken together with the positions of the different parts of the wreck, go very far toward proving:

First, that the point of failure was in the western half of the south girder, viz., between its centre and the west abutment.

Second, that as far as the position of the wreck tends to show, there is no evidence that any derailment took place.

Other facts also controvert the theory that derailment was the cause of this disaster.

Steam was shut off about 100 yards east of the bridge.

and the speed of the train at the time of crossing did certainly not exceed 10 miles per hour. This low rate of speed would never, in case of and after derailment, have left the engine momentum enough to shoot clear across a space of about 50 feet. Another and inevitable effect of this low rate of speed would have been the "bucking" of the cars immediately in the rear of the engines, several seconds at least ahead of the giving way of a good and sound bridge.

Now all the survivors, among them the conductor of the train and the superintendent of the road, who were in the baggage car, unite in saying that there was no "bucking," no warning of any kind that anything was wrong, only the momentary sickening stillness, the awful sensation of sudden sinking, and then—the crash. Moreover, what could cause derailment to a train on a tangent, running at the rate of 10 miles per hour? A railroad employee, who rode with the engineer on the forward engine, moreover says that there was no obstruction on the track and that the engine did not leave the track. He certainly was in a position to know.

This possible cause of failure eliminated, there remain others to be considered. The possible causes of failure in bridges are so manifold that it is almost impossible to classify them. For our present purpose it will be quite sufficient to consider the following, viz.:

1. Defective design.
2. Overloading.
3. Defective workmanship.
4. Inferior or defective material, and
5. Neglect in maintenance.

So far as the design of the bridge under consideration is concerned, no fault is to be found. The sizes of its principal members, as previously given, compared with a strain diagram resulting from a live load of 2,500 lbs. per lineal foot, show that the bridge was designed amply strong to carry any load that might come upon it. The wrought-iron tie-rods are rather light, but not too light, if the best quality of American iron had been used, capable of resisting an ultimate tensile stress of 55,000 lbs. with an elastic limit of not less than 50 per cent., or say 27,500 lbs. per square inch. The sizes of the timber also presuppose the best quality of yellow pine. The margin of safety, though small, was ample, in consideration of the anticipated traffic of the road.

Neither was the bridge overloaded. Floor beams and track stringers were proportioned for 5,000 lbs. per lineal foot, a far greater wheel-load than was on the track at the time of failure. The two engines drawing the train were the "Salisbury," an eight-wheel, 28-ton engine, 5 ft. drivers and 7 ft. 6 in. driving wheel-base, with 4½ tons on each driver, and the "Tariffville," an eight-wheel, 33-ton engine, 5 ft. 6 in. drivers, and 7 ft. 9 in. wheel-base, with 5½ tons on each driver.

Reducing maximum load from the "Salisbury" to equivalent uniformly distributed load per lineal foot in ten-foot panel, we have 3,900 lbs., and from the "Tariffville," 4,200 lbs. per lineal foot.

In order to form any opinion of the workmanship, it will not be considered unfair to judge the fallen span, or rather the whole bridge, by the remaining span.

The timber-work, framing, etc., though not strictly first-class, may be called good. Not so the iron-work.

The tie-rods are not upset at the ends, but the screw threads are cut into the rods, thus reducing the effective area of an 1½ rod from 2.405 square inches to 1.767 square inches, a loss of 26½ per cent. of effective area. The 1½ in. rods are reduced in the same manner from 1.767 square inches to 1.227 square inches representing a loss of 30½ per cent. of effective area. There are too few threads to the inch, and nuts and washers are badly proportioned. The writer called the attention of an official of the road to the fact that some of the tie-rods showed the effects of buckling, but was told that "they were not buckled, that merchant iron was always bought more or less crooked; these rods had been put in crooked in the first place, and there had never been really strain enough upon the bridge to straighten them out."

The cast-iron work is also very bad, and the angle-blocks are very fair specimens of how angle-blocks should not be cast. Of seven selected at random, which were examined, four were cracked and otherwise injured.

The worst feature of it all is the cutting of the threads into the rods without upsetting the ends for the full depth of the thread. The fact that all the broken tie-rods of the wrecked span were broken within the threaded ends shows very clearly where they were weakest.

As to the quality of the material in the bridge, very little can be said that will be favorable to it. The yellow pine timber used was of second growth, some of it good enough, some indifferent, and some which never ought to have been put into a bridge. Yet it cannot be denied that the present bad condition of the timber is largely owing to the neglect of housing or covering the bridge. Absolutely nothing has been done by the railroad company toward the maintenance and protection of the structure, and for seven years the timber has been exposed to snow, rain and sun. The bridge ought to have been covered at least in the third, if not the second year after its erection.

A piece of the upper chord which the writer had sawed off shows 2 inches of the 11 of its depth rotted away.

So far as the wrought iron can be judged from the different fractures seen, it was decidedly of a very inferior quality.

A sufficient quantity of timber and iron rods of the wrecked span have been secured to show by actual tests the quality and value of the material in the bridge. The results of these tests, and if possible also illustrations of the fractures, etc., will be given in a second paper.

ALBERT F. HILL, C. E.





Published Every Friday.

CONDUCTED BY

S. WRIGHT DUNNING AND M. N. FORNEY.

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## EDITORIAL ANNOUNCEMENTS.

**Passes.**—All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.

**Addresses.**—Business letters should be addressed and drafts made payable to THE RAILROAD GAZETTE. Communications for the attention of the Editors should be addressed EDITOR RAILROAD GAZETTE.

**Advertisements.**—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

**Contributions.**—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

## SCREW THREADS.

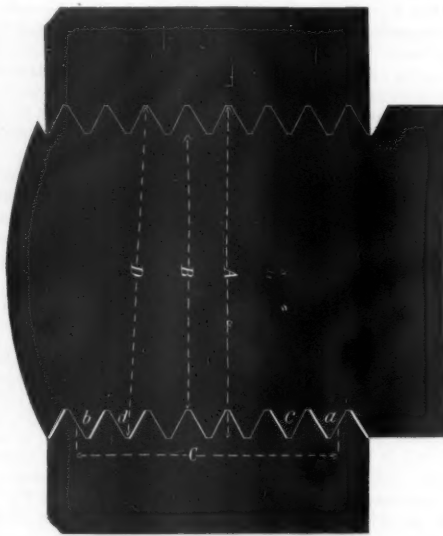
Some one has said that "it is not a bad plan, when you have once got hold of a truth, to keep hammering it into people's heads on all occasions, even at the risk of being voted a tedious bore or a victim of crotchets. We live in a hurried and not over-intelligent world, wherein the wariest of us do not always pay due heed to what we are told, and the keenest do not always divine its sense." A very excellent essay has been written on the "Capacity of the Human Mind to Resist Knowledge," and the experience of most of us who are busy is that there are so many things which we are required to know or learn, that gradually the habit grows on us of declining new information for which we have no immediate use; and unless there is some special reason for listening, most of us are inclined "to pass by on the other side" when a prophet is elucidating any new doctrines.

Many of those for whom we are writing, no doubt, feel so about the subject selected for this article. The screw-threads which they have used have worked, they think, satisfactorily. All the machines which they use have been constructed by the system or want of system which happens to be in existence, and which was born and nurtured by a series of accidents, and which in a certain ineffective way has fulfilled all the requirements which are demanded of screw threads. It is true that it happens at times that nuts with 16 threads to the inch are screwed on bolts with 14 or 15 threads, very much to the disadvantage of both the nut and the bolt, and also to the purpose which they are both intended to serve. The general tendency of nuts to work loose when they ought to remain tight is also noted, but that is attributed to the general depravity inherent in things, but especially so in bolts and nuts. The truth is that the great majority of mechanics have always been accustomed to poor workmanship in the construction of bolts and nuts. They have never or rarely known them to fit each other accurately, and do not realize that it is possible to have them do so.

A little reflection will show that it is very difficult

to make a bolt and a nut which will fit each other accurately. It is comparatively a modern triumph of mechanical skill to make a plain cylinder of steel fit a corresponding cylindrical hole, as in the Whitworth gauges. It is only with the best tools and most delicate measuring instruments that this can be done. But a cylinder can be turned in a lathe and the hole can be drilled or bored in machines made to do that kind of work. In other words, there is little trouble, with modern tools, to produce a true cylinder and a cylindrical hole, the chief difficulty being in making them of exact sizes, to correspond with each other. Generally, too, neither workmen nor their employers realize how small the quantities are which makes the difference between a good and an imperfect fit. To show this, the following observations of Sir Joseph Whitworth are quoted. In one of his "Miscellaneous Papers on Mechanical Subjects," he says: "As an illustration of the importance of very small differences of size, I have made an internal gauge having a cylindrical aperture of  $\frac{5770}{10000}$  of an inch diameter and two external gauges, or solid cylinders, one being  $\frac{5769}{10000}$  of an inch and the other  $\frac{5771}{10000}$  of an inch diameter. The latter is  $\frac{1}{10000}$  of an inch larger than the former, and fits tightly in the internal gauge when both are clean and dry; while the smaller,  $\frac{5769}{10000}$  of an inch gauge, is so loose in it as to appear not to fit at all."

In the case of a screw, while such an amount of inaccuracy may not be so easily perceptible as in a pair of Whitworth gauges, yet it has just as much influence on the perfection of the fit. In both cases a cylinder fits into a cylindrical hole, the only difference being that in the one case the



surface of the cylinder and hole is plain and in the other it is grooved. The same amount of difference in the size of two screws will be sufficient to make one fit well and another imperfectly. A mechanic who would at once perceive and condemn the bad workmanship of a shaft which was fitted into a pulley so that it was either too loose or too tight often seems to be oblivious of an equal amount of careless or stupid workmanship in a nut which is either so loose that "it shakes" or so tight that undue force must be exerted to turn it.

Twenty or twenty-five years ago it was considered necessary in fitting the crank-pins of locomotives into the wheels to make both the pin and the hole tapered so as to secure a good fit. This was done because the pin could then be driven into the hole and thus be made to fit accurately. Car wheels were keyed fast to the axles to prevent them from working loose. With improved lathes and boring machines it was soon found that the pins and the holes could both be made so perfectly cylindrical and with so much precision that the use of a taper was not needed to make a good fit nor keys required to hold the wheels on the axles, and now crank-pins are turned straight and pressed into the wheels without any other fastening. If a nut was fitted to a bolt as accurately as a crank-pin is to the wheel, the former would be no more liable to work loose than a crank-pin is. Yet who would think of screwing a crank-pin into a wheel or crank?

Every mechanic knows that the ordinary means of making screws are so rude that it is impossible to fit a screw to a nut with the same degree of accuracy as a plain cylindrical crank-pin or shaft may be fitted into its boss or hub. It is of course much more difficult to fit a screw accurately to a nut than to fit a shaft into a hub, because in the one case we have a plain cylinder fitting into a cylindrical hole, in the other the cylinder and the hole each have a spiral groove cut over the whole of their surface. The ridges left between the grooves of the

one must then fit into the grooves of the other. To make a bolt and nut fit each other we must therefore first make the bolt a perfect cylinder whose diameter,  $A$ , in the engraving, is of some exact size. We must then make the diameter  $B$  of the hole in the nut equal to  $A$  less twice the depth of the thread. Now it must be remembered that a difference of  $\frac{1}{10000}$  of an inch in these dimensions will be sufficient to make the difference between a good and bad fit, and it will show how accurate this part of the work must be in order to secure precision. Having what is called the blank, that is a plain cylinder without a thread, and a cylindrical hole, also without a thread, the next step is to "cut the threads." This expression is in fact not strictly correct. In making a screw, the thread is not cut, but the space between the threads. In doing this we must be certain, first, that the spiral will progress at the same rate on both the bolt and the nut. Ordinarily it is supposed that if we fix upon some "standard" number of threads to an inch, then this element in screw construction is provided for. Probably, owing to the inaccuracy of the tools used, which is due to wear and other causes, this element in the construction of screws comes very far from being as accurate as it should be. At any rate we are told that "the screw which Sir Joseph Whitworth uses in his works as the standard from which other screws are cut is 30 feet long, with a square thread of  $\frac{1}{2}$  inch pitch bounded by a cylinder of  $2\frac{3}{4}$  in. diameter. Every part of the thread from end to end has been carefully tested by an extremely delicate process, in which the measuring machine has borne an important part; and the care and trouble bestowed upon the operation may be judged of when it is stated that Sir Joseph Whitworth devoted a period of six months of his own personal attention and superintendence to making the necessary corrections for perfecting the screw."

Probably the degree of accuracy attained in this way, if compared with that of the ordinary lathes in use in many of our shops, bears somewhat the same proportion that fine-powdered emery does to cobble stones. It is evident though that it is absolutely necessary in order that a screw may fit into the nut that the rate of progress of the thread or the "pitch" of the one should be precisely the same as that of the other. If it is not then the surfaces of the threads will bear on each other on one side only, and probably some of them not at all. Thus, supposing that the bolt in the engraving is cut so that it has say eight threads to an inch, and the nut with eight threads to  $\frac{1}{16}$  of an inch, then it is evident that the distance  $c$  between the inclined surfaces  $a$  and  $b$  of the thread of the nut is appreciably less than that between the corresponding inclined surfaces of the thread on the bolt, and therefore, in order to make the nut screw on the bolt it will be necessary to make the grooves between the threads of the one larger than the corresponding thread, in the other, so that when the nut is screwed on the bolt the surfaces  $a$  and  $b$  will be in contact, as indicated by the fine line, while those opposite will be wide open, as shown by the coarse line. In the adjoining threads  $c$  and  $d$  a similar relation between the surfaces exists, although the contact on the one side will then not be so close nor the space between them on the other so wide. The surfaces of the middle threads will probably not be in contact on either side. It will be seen from this that the work which the screw must do, as the strain is usually in only one direction, is in such case done by the surface of only one or two revolutions of the thread, as  $a$  and  $c$ , instead of being distributed over its whole length, so that unless the rate of advance of the spiral of the thread, or its "pitch," is correct, it will be impossible to secure a good fit of a screw in a nut.

It is also evident that if the angle of the sides of the threads in the nut and on the bolt are not correct there cannot be a uniform bearing of the one on the other. If the one is obtuse and the other acute, they will bear at the point or root only, as the case may be. It is therefore important that this angle should be fixed and maintained so as to be as nearly perfectly accurate as it is possible to make it. In the Franklin Institute system of threads, which is the one which can lay the best claim to being a common standard in this country, as most of our readers know, the angle of the sides of the thread to each other is fixed at 60 degrees. But even if this is established and maintained, it is also important that the threads should be "square" with the axis of the bolt. Thus, in cutting a screw in an ordinary lathe, although the cutting tool may be accurately ground to the proper angle, it is still possible to set it inclined to the axis of the bolt or screw, so that the threads would be what in workmen's phraseology is called "drunk," that is one side will stand at an angle of, say 25 degrees to the axis of the screw, and the other at 55,



If that were the case and the thread in the nut inclined in the opposite direction to that in the bolt, it is also clear they would not fit each other.

If all these conditions have been fulfilled it is still obvious that if in cutting the bolt the cutting tool be allowed to cut away too much of the material between the threads, the screw will thus be made too small for the nut. That is, if we had a pair of callipers the points of which fit accurately into the groove between the threads we might thus measure the diameter of the bearing surfaces or sides of the threads. In doing this there is, however, some difficulty. As the spiral of the thread turns around the screw it also advances, so that the groove on one side of the screw is not opposite to it on the other. Therefore in measuring with a pair of callipers instead of measuring the diameter of the screw we would measure on a line *D* inclined to the axis and which is the length of the transverse axis of an ellipse, which is the form of the section of a cylinder if cut at an angle greater or less than 90 degrees to its axis. There is also another difficulty. If the points of the callipers were made to fit the groove if placed at right angles to the axis of the screw they would not fit if inclined, so that it is almost impossible to measure the diameter of a screw accurately with ordinary tools.

The form of the Franklin Institute thread is flat at the top and bottom, or on the point and root of the thread. The amount of this flat portion is some definite proportion of the pitch of the thread. Now if the diameters *A* and *B* for the bolt and nut and the angles of the threads and the true proportion of the flat part of the point and root are all maintained, then the bolt and nut must fit each other. What we have aimed to point out is the great difficulty of securing all these proportions with ordinary tools and methods of measurement, and also the importance of great accuracy in the fitting of these parts. It is of course true that bolts and nuts are not now manufactured in the way which has been described, but the taps and dies are, and it is in the production of these tools that every master mechanic should aim to secure accuracy. It is, we believe, impossible to do so with the ordinary tools in use. That this is so is indicated by the fact that establishments which within a few years have made a specialty of the manufacture of taps and dies have expended very large sums of money for special tools for doing this work, and at the present time, either it is impossible without such special facilities to do this work with the needed precision and at the same cost, or else the manufacturers of those tools have expended money very foolishly. It is believed, too, that no railroad company can now compete either in the cost or the accuracy of work with several establishments which are supplied with special machinery for the manufacture of taps and dies. In fact, the men in charge of this kind of work in most of the railroad shops are to a great extent ignorant of the machinery and the methods employed and which have within a few years been devised especially for the manufacture of such tools. If master mechanics would visit the Pratt & Whitney Company's establishment in Hartford, Conn., and examine their special machinery for the manufacture of taps and dies, it would be, we believe, a new revelation to most of them of the resources which recent inventions and improvements have supplied in the manufacture of such tools, and the advantages of accuracy and uniformity of screw threads must, we feel sure, be derived from the manufacture of the tools which produce them in establishments like that referred to, which have special facilities for doing such work.

Of the evils of inaccuracy in screws Sir Joseph Whitworth says:

"It is mainly from want of accuracy that screw-bolts so frequently fail. Unless the threads of the screw and nut exactly correspond in every part, and coalesce throughout their whole length and depth, their mutual action is completely deranged, both power and strength are sacrificed, and friction is proportionately increased. The immense consumption of bolts and nuts in fitting up and working machinery may give some idea of the extent to which greater accuracy may be productive of economy."

It is time for every master mechanic to ask himself whether with his tools and machinery he can make taps and dies as accurately and as cheaply as other establishments in some of which from fifty to a hundred thousand dollars have been expended in special machinery for doing such work.

#### TRAIN ACCIDENTS IN 1877.

We have now compiled and published a record of the train accidents reported upon the railroads of the United States every month for the last five calendar years. From time to time we have explained the nature and purpose of these monthly records, but the number of new readers and of old ones who forget makes it advisable to repeat this explanation quite frequently. Moreover, many consult these accident

records who are not regular readers of the *Railroad Gazette*. Journalists, public men and inventors, and the like, sometimes have occasion to know what are the number, and consequences of the railroad accidents in the country, or the frequency of a particular class of accidents, or the fatalities from one class. These often look at the record in this paper as one might at a dictionary or encyclopedia, and the explanations and limitations which we have taken pains to repeat so frequently are apt to go for nothing with these people.

First of all we desire to emphasize the fact that this is a record of train accidents only. No account whatever is taken of injuries to persons on the track, which cause by far the largest number of the fatalities, whether the persons injured are at fault or not; nor of the not uncommon cases of persons injured in falling or jumping from trains, etc. Our special aim is to record the accidents which occur to trains. It certainly is desirable to have a complete record of all other accidents; but there are now no means of making such a record.

In the next place, we disclaim all pretense to completeness in our record, even as to train accidents. Our information comes chiefly from the newspapers of the country, with some aid from correspondence. Newspapers from all parts of the country are examined and searched with great care; but there is a very large number of accidents to freight trains which are never reported in any newspaper. These accidents usually are not very serious. If they result in a considerable destruction of rolling stock or other property, if they cause much delay to passenger trains, and especially if any of the train men are injured, they are likely to be reported in some newspaper on the line. Slight accidents to passenger trains are likely to be reported, though there doubtless are sometimes derailments which even the passengers on the train itself are not aware of.

It thus is evident that it is the more serious accidents which are most likely to be chronicled in our record. There are probably several times as many slight accidents which we never hear of; but there cannot be many causing death or serious injury which escape our notice.

The year 1877 was for the most part favorable to the safe working of railroads in this country. The number of accidents varies greatly with the severity of the winter weather. If it is very cold, with much snow, we invariably have a very large number of accidents to record. January of last year was a very bad month, and the accidents reported for that month were twice as great as the average of the year. Winter accidents are not always severe, however, though a great many slight injuries are likely to be caused by them.

One thing may have had the tendency to reduce the number of accidents in 1877, and that is the general dullness of passenger traffic. The quantity of traffic, however, is not likely to affect the number of accidents greatly, unless the number of trains is changed in consequence. Number and speed of trains are the two chief elements in connection with traffic that have a direct relation to the number and fatality of train accidents. The other elements of most effect do not belong to traffic, being condition of road and equipment, intelligence, skill and discipline of the working force, which latter are not likely to change very greatly in a single year. The condition of the road and equipment may, however, be changed quite rapidly, and in times of general business depression like these, when most railroads have had a reduced income, there is always danger that insufficient expenditures will be made for maintenance, and doubtless there are always some roads that are badly "starved" under such circumstances. Such "starving" has been suspected of a great many important railroads since 1873 and charged upon some of them, but this is a practice which cannot be kept up long without becoming manifest, and our accident reports, covering as they do a mileage increasing from year to year, indicate that the average condition of American railroads has improved rather than depreciated of late years.

The numbers of train accidents and of persons killed and injured by them, reported in our record for each of the past five years have been:

	1873.	1874.	1875.	1876.	1877.
Accidents.....	1,283	980	1,201	982	891
Killed.....	276	204	234	328	214
Injured.....	1,172	778	1,107	1,007	1,047

The number of accidents reported last year thus is the smallest for the five years, and about nine per cent. less than in 1876, and 30 per cent. less than in 1873. As we have said, however, our record is not at all complete as to the number of accidents, and perhaps it is not worth while to compare them for the different years. The number of killed and injured is much more nearly correct. Comparing these we find 1877 the most favorable of the five years, next to 1874. Compared with 1876, it shows one-third fewer killed

and about one-twentieth fewer injured by train accidents. The year 1876, however, has the horrible distinction of the Ashtabula accident, and there was no great and memorable disaster in any degree comparable with it that happened in 1877—nothing even like the Tariffville accident of last week, that came one year and eighteen days after the Ashtabula wreck.

The classification of the accidents of each of the past five years, according to their nature or causes gives the following results:

	1877.	1876.	1875.	1874.	1873.
<b>COLLISIONS:</b>					
Rear.....	159	159	141	131	187
Butting.....	96	94	104	87	102
Crossing.....	13	15	18	19	31
Unknown.....	11	15	23	23	72
<b>DERAILMENTS:</b>					
Unexplained.....	177	185	222	218	315
Broken rail.....	46	50	107	42	111
Misplaced switch.....	70	89	81	67	72
Cattle on track.....	43	40	51	45	54
Wash out.....	17	40	44	10	30
Loose or spread rails.....	41	43	40	16	13
Broken axle.....	38	39	30	20	21
Accidental obstruction.....	22	36	37	51	44
Snow or ice on track.....	25	16	36	13	9
Broken wheel.....	12	22	33	20	26
Broken bridge or trestle.....	21	20	26	33	19
Malicious obstruction.....	11	11	21	22	11
Broken track.....	8	10	15	8	7
Broken or defective switch.....	6	4	15	12	10
Land-slide.....	11	9	11	12	10
Broken or defective joint.....	2	1	10	5	3
Broken or defective frog.....	2	3	8	8	4
Wind.....	2	2	7	7	7
Rail removed or displaced.....	7	7	8	7	16
Broken parallel or connecting rod.....	1	1	5	5	5
In making flying switch.....	2	4	4	4	4
Failure of coupling or draw-bar.....	1	1	3	7	8
Broken car.....	1	2	3	3	3
Runaway engine.....	1	1	3	1	6
Running through siding.....	3	6	2	3	3
Loose wheel.....	1	3	2	4	2
Open draw-bridge.....	4	3	2	6	4
Failure of brake or brake-beam.....	4	2	13	7	7
Careless stopping or starting.....	1	1	3	4	9
Overloading car.....	1	1	3	3	3
Bad switching.....	1	1	2	2	2
Running over man.....	1	1	1	1	2
Flood over track.....	1	1	1	1	2
Others (one each).....	4	1	3	11	7
<b>TOTALS:</b>					
	891	982	1,201	980	1,283
<b>RECAPITULATION:</b>					
	1877.	1876.	1875.	1874.	1873.
Collisions.....	268	279	278	260	362
Derailments.....	581	655	840	654	815
Other accidents.....	42	48	83	66	76
TOTALS.....	891	982	1,201	980	1,283
Average number per day.....	2.44	2.69	3.29	2.68	3.51

Information as to the cause of an accident is often indefinite, and many of those which we report are secondary causes. We give them as definitely as our information permits; and there are a good many lessons that may be drawn from this list. Breakages of rails vary with the severity of the weather and the condition of the roads at that time, wash-outs and land-slides with the storms of rain, and there are some others which depend more or less upon the weather, but most of them cannot be charged upon any such scape-goat.

Of the derailments for which causes are assigned, the percentage due to each of the chief causes was as follows in the several years:

	1877.	1876.	1875.	1874.	1873.
Broken rail.....	11.4	10.6	17.3	9.9	22.2
Misplaced switch.....	17.3	18.9	13.1	15.4	14.4
Cattle on track.....	10.6	9.7	8.2	10.3	10.8
Wash-out.....	4.2	8.5	7.1	2.3	6.0
Loose or spread rails.....	10.1	9.2	6.5	3.7	2.6
Broken axle.....	10.7	8.1	6.3	4.6	4.2
Accidental obstruction.....	5.4	7.7	9.0	11.7	8.8
Broken wheel.....	3.0	4.7	5.3	4.6	5.2

Misplaced switches have been altogether too numerous during the past two years. Some were maliciously misplaced, but in most cases it is carelessness or negligence or lack of discipline to which the misplacement is due. A larger proportion than heretofore of loose or spread rails and of broken axles is reported.

A more general classification of the causes of derailments gives the following:

	1873.	1874.	1875.	1876.	1877.
Defects or failures in permanent way.....	300	146	261	165	137
" " rolling stock.....	73	63	101	76	67
Negligence, carelessness or malice.....	96	107	114	119	97
Unforeseen obstructions not malicious.....	111	109	142	107	113

Defects in rolling-stock seem rarely to occasion derailments important enough to be reported. Of the whole number (67) reported last year, 43 were broken axles, which indicates that they might be made bigger or better with advantage. The accidents from broken wheels are curiously few, especially in view of the fact that nearly all car wheels on our roads are of cast iron, and that such wheels are discarded in most European countries for supposed want of safety. However, with our system of cars, resting on four-wheeled trucks, a broken wheel does not cause derailment in most cases. A second result of the use of cast-iron wheels is the absence of numerous accidents from broken and loose tires, such as are common in Europe. A single derail-



ment is reported in our record of 1877 as due to a broken tire.

"Negligence, carelessness and malice" are charged above with 97 accidents—a smaller number than for three years previous. However, doubtless, many if not most of the accidents charged to defects of road and rolling stock are justly chargeable to negligence, to which the defects were, many of them, due. And this is doubtless true also of not a few of the "unforeseen obstructions not malicious," many of which ought to have been foreseen and provided against.

As indicating the effect of severe weather on track (not necessarily on iron, however,) we give below the breakages of rails reported for the first and third quarters respectively of each of the five years:

*Accidents caused by broken rails in the Quarter including January, February and March and in that including July, August and September, for five years.*

	1873.	1874.	1875.	1876.	1877.	Total.
First quarter.....	55	30	90	20	36	231
Third quarter.....	5	3	3	5	7	23

This indicates that there were *nine times as many* accidents by broken rails in the cold as in the hot quarters of the year, and the effect of the severe weather is further shown by a comparison of the breakages in the cold winters of 1873 and 1875 with those in the milder winters of 1874 and 1876. There was but one month of very severe weather in the winter of 1877, but to that month belong 17 of the accidents by broken rails, or three-eighths of the whole number.

There is one class of accidents which continues shamefully great, that is those due to the failure of a bridge or trestle. There were 21 of these in 1877, notwithstanding the terrible warning given by the Ashtabula disaster, which we know to have caused extraordinary precautions on a number of roads. Nearly all the bridges that failed were wooden structures, it is true, and in several cases the failure was in the foundations. But it is every cause of failure that needs to be guarded against in such structures, and the Tariffville disaster comes now to revive the warning given at Ashtabula a year ago, and to suggest that bridges of all kinds should be frequently examined by experts; and other cases warn us that care should be taken not only to have bridge superstructures which will rest firmly on their foundations, but also to have foundations which will stand up firmly under the superstructures.

Collisions are perhaps the best tests of skill and discipline in train management. The number last year is nearly up to the average of the three preceding years, and does not reflect much credit on the transportation departments. We suppose that every case of collision may be safely charged to negligence by some one. Increase in the average intelligence and skill of trainmen and those who give them orders will do much to reduce the number, but in this matter severer discipline perhaps is more needed than greater intelligence.

#### Freight Rates.

The outlook for maintaining rates on Winter traffic has changed somewhat since last week, but on the whole favorably. There has not been, however, any cessation in the cutting of rates on east-bound traffic, and no step taken, so far as we know, to enforce the agreement of the Western companies, which the trunk lines have agreed and re-agreed to do, on application through the duly authorized organs of the Western companies. Probably most of the traffic taken for shipment to the East recently has been accepted at a reduction of the regular rate of 40 cents for grain and fourth-class freight. The bulk of the traffic at this season is hog products and grain. But the reductions are generally reported to have been comparatively small, and the rates actually received to have left a tolerable margin of profit. Moreover, recently it is said that the east-bound rates have stiffened under the influence of freezing weather, solid roads, and larger offerings of traffic.

A great deal has been said in New York during the past week of a great diversion of west-bound freight from the trunk lines to roundabout ocean-and-rail routes, chiefly to steamers to Portland and the Grand Trunk to the West, but also to Charleston and Port Royal and even New Orleans.

It is true that some freight is taken by these routes, and there has probably been some increase recently in the shipment by way of Portland, by which the charge is said to be 70 cents per 100 lbs. for first-class freight, as against \$1 by the trunk lines. That there has been any considerable diversion of the traffic, however, to this or any other route does not appear. The office of the Trunk Lines Commissioner keeps an exact record of all shipments by these lines, and any great diversion of traffic is sure to be shown by a decline in the aggregate shipments by the trunk lines. But we are told that the fluctuations recently have not been great enough to attract attention.

A greater trouble is liable to be caused by the Grand Trunk's competition for Boston and New England freight. While this of course is not included in the New York apportionment, and no possible conflict concerning it need or is likely to affect the compact of the trunk lines, it may very greatly affect the rates which it will be necessary to make on New York shipments. The trunk lines will have to protect the New

York merchants against any great discrimination in rates in favor of Boston merchants, however occasioned.

Indeed, the co-operation of the Grand Trunk is of great importance to any combination on either east-bound or west-bound business, and that it is so recognized appears from the fact that the two commissioners, Mr. Fink and Mr. Guilford have been instructed to negotiate with that company. Mr. Fink reports Wednesday that the company is disposed to agree to a division of the Boston business. If the terms of a division can be agreed upon, this will be likely to settle the whole question as to west-bound business.

At this season of the year, just before the spring shipments begin, every circumstance that is likely to work against the maintenance of agreed rates is sure to be made the most of. All merchants are properly anxious that their business should not be injured by unusually large differences in rates in favor of other places; but the most talk is made by a certain number of large shippers who greatly desire to bring about some state of things which will enable them to get a rebate or long contracts for rates lower than their competitors in business can get.

The immediate effect of reports of trouble or of probable great reductions in rates is to reduce the volume of shipments. Shippers withhold the freight, if they can, in order to take advantage of the expected or possible reduction, as is quite natural.

#### Is There a Heavy Winter Grain Traffic?

Efforts have been made recently to show that the talk of big crops and heavy shipments and busy railroads has no basis in truth; that the grain business is light rather than heavy, and that the railroads cannot be making much out of it.

It is true that those who are trying to sell stocks at high prices are apt to exaggerate the amount and profitability of the existing traffic, but it is also true that those who are bearing stocks do the contrary, and it may be worth while to examine into the facts in the case to learn who is lying, or who is lying the most.

For the six weeks from Dec. 1 to Jan. 12 the receipts and shipments of grain of all kinds have been, in bushels, for a series of years:

<i>Receipts at Northwestern markets:</i>					
1873.	1874.	1875.	1876.	1877.	1874.
13,173,097	15,146,694	14,442,394	7,423,406	18,988,632	

The receipts of this winter, therefore, are smaller than for the two years previous, and much smaller than in the winter of 1873-74, when the winter movement was extraordinary and much greater than ever before.

The receipts at Northwestern markets are the measure of the grain business of some of the Northwestern railroads; their shipments, of the business of some of the lines intermediate between the Northwest and the trunk lines. These shipments for the same six weeks of the same five winters have been:

<i>Shipments from Northwestern markets:</i>					
1873.	1874.	1875.	1876.	1877.	1874.
6,978,363	6,785,792	6,563,110	4,170,602	8,644,823	

Here we see that ordinarily the Northwestern markets receive much more than they ship in the winter—storing largely to await the opening of navigation. And though the receipts at these markets were smaller this winter than before for two years, their shipments were larger than before for three years, and have been exceeded but once in the history of the traffic—in the exceptional winter of 1873-74.

But if we are to consider the railroads as a whole, and the trunk lines especially, neither of these statements will suffice. Not all the grain of the country—not even all the Northwestern grain—is received or shipped at the eight Northwestern markets that report, namely, St. Louis, Peoria, Chicago, Milwaukee, Duluth, Detroit, Toledo and Cleveland. The best criterion of the general grain movement, and the decisive one as to the grain traffic of the trunk lines, is the record of the receipts at the seven Atlantic ports. These have been for the six weeks:

<i>Receipts at Atlantic ports:</i>					
1873.	1874.	1875.	1876.	1877.	1874.
17,963,950	11,721,446	10,164,850	8,706,123	10,420,105	

This certainly is conclusive. The movement this year has never been approached before. It is 73 per cent. greater than in 1873-74, and 53 per cent. greater than last winter. It is an enormous business, and must have produced very large earnings, even at rates something lower than those agreed upon. If the receipts continue at this rate, the winter business will amount to something like 60,000,000 bushels before navigation opens, which is equal to four-elevenths of the whole business of 1877, to be moved in 21 of the 52 weeks. And nearly all this business is done by the railroads. New Orleans is receiving more than ever before, but so far this winter not more than one-eighth of the total, and most of that is carried by rail part of the way.

THE CAPITAL RAISED IN 1877, so far as made public, for government and municipal loans, banking institutions and industrial enterprises (the latter chiefly railroads) is stated by the Belgian *Moniteur des Interets Matériels* to have been \$1,580,976,500; but 74 per cent. of the whole was for government loans, and only 22 per cent. for industries. The total reminds one of the years of prosperity and speculation before 1873, being more than twice as great as in 1876 and nearly five times as great as in 1875; but the largest item in it is the United States loan made simply to refund a previous loan of the same amount at lower interest, and the next largest item is \$200,000,000 borrowed by Russia to carry on its war. More than four-fifths of the capital raised for industrial purposes was for France, where it was largely used in constructing railroads of local interest, which according to previous experience will not be likely to pay more than 1 per cent., and partly by the old and strong companies to take

advantage of the low prices to supply all their wants, and, so the *Moniteur* says, also to order materials in advance for the avowed purpose of keeping the manufacturers busy during the dull times! What will be done for the manufacturers when the railroads come to use this stock of stored material we are left to imagine. America is credited in the list as having borrowed \$4,250,000 for railroads and the like.

THE CAPITAL OF THE NEW RAILROADS seems to keep itself hid from the world. Of the 117 companies that laid track in 1877, we cannot recall one that offered bonds on the market or whose stocks and bonds are generally known and current—with the exception, of course, of the old companies that made branches and extensions, and in these cases, even, hardly one based a new public issue of bonds on the new road. Apparently, the new roads have been built with the money of men who know the circumstances, and have taken an active part in the management, largely probably raised in the vicinity, and for the rest chiefly by large capitalists who have invested after personal investigation. We remember but two advertisements of new issues of bonds for a year in this country, and in both of these cases the roads had been in operation some years.

TRANSPORTATION IN BONDED CARS has assumed considerable proportions during the four years that it has been provided for by law, the chief cities of the Northwest importing considerable stocks of merchandise which by this arrangement they have accessible at any time and pay duties on only when the goods are needed. A special agent of the Treasury has recently made a report showing that during the six months ending with November last 4,290 cars containing bonded goods and sealed were dispatched from New York, and 4,284 were received there. This is an average of about 23½ cars daily. There is also a considerable business at Philadelphia, Baltimore and Boston.

OUR RECORD OF NEW RAILROAD CONSTRUCTION FOR 1877, published last week will require numerous corrections, in accordance with answers to our letters of inquiry received since, but the corrections largely balance each other, and at present we have only about eight miles to add to the total of the year, making it 2,207. The changes will be published in detail when fuller information is obtained.

THE ERIE FORECLOSURE SALE, which was to take place last Monday, has been postponed until March 23, by order of the Court, which has under consideration the application for a permanent injunction against the prosecution of the McHenry suit in Monroe County, and the application of certain other parties to be admitted into another suit.

## General Railroad News.

### MEETINGS AND ANNOUNCEMENTS.

**Meetings.**—Meetings will be held as follows: St. Louis, Kansas City & Northern, annual meeting, at the office in St. Louis, March 5, at 11 a. m. Transfer books will be closed from Jan. 31 to March 6.

Wabash, annual meeting, at the office in Toledo, O., Feb. 20, at 10 a. m. Transfer books will be closed 20 days before the meeting.

Huntingdon & Broad Top, annual meeting, at the office, No. 517 Walnut street, Philadelphia, Feb. 5, at noon.

**Dividends.**—Dividends have been declared as follows: Illinois Central, 3 per cent., payable March 1. Transfer books will close Feb. 12.

Mill Creek & Mine Hill, 5 per cent., payable in Philadelphia, Jan. 18.

Mount Carbon & Port Carbon, 6 per cent., payable in Philadelphia, Jan. 18.

Schuylkill Valley Navigation & Railroad, 2½ per cent., payable in Philadelphia, Jan. 18.

Railway Equipment Trust of Pennsylvania, 2 per cent., quarterly, payable in Philadelphia, Feb. 1.

Car Trust of Pennsylvania, 1½ per cent., quarterly, payable in Philadelphia, Feb. 1.

Illinois & St. Louis Railroad Company, 2½ per cent., from the net earnings for 1877.

**Foreclosure Sales.**—The following sale are reported: Brownville, Fort Kearney & Pacific, under foreclosure of first mortgage, last week. It was bought for \$309,000 by parties said to have been acting for the Burlington & Missouri River Company in Nebraska. No track was ever laid on the road, but it was graded several years ago from Brownville, Neb., westward to Tecumseh, 35 miles. A little over two years ago the company was consolidated with the Midland Pacific as the Nebraska Railway Company.

The sale of the Erie Railway has been postponed for 60 days by order of the court, which will take it over to March 23.

**Claim Agents' Convention.**—The second meeting of the Association of Railroad Claim Agents was held at the Tremont House, Chicago, Jan. 15, in accordance with the call issued Dec. 17. The meeting was called to order by Mr. P. H. Dennis, Chairman of the first meeting. The roll of these present was called by Mr. R. N. Adriance, Secretary of the former meeting, and there were found to be present the following:

R. A. Abbott, Claim Agent, Michigan Central; W. R. Head, Personal Injury Agent, Illinois Central; W. F. Smith, Claim Clerk, Lake Shore & Michigan Southern; G. M. Fadden, Traveling Freight Agent, Chicago & Alton; J. J. Rogers, Claim Clerk, St. Louis, Iron Mountain & Southern; E. Darrach, Missing Coal, Freight and Baggage Agent, Philadelphia & Reading; H. Walker, Claim Clerk, Toledo, Peoria & Warsaw; J. O'Grady, Claim Clerk, Chicago, Burlington & Quincy; W. H. McGinness, Claim Clerk, Houston & Texas Central; T. H. Malone, General Freight and Passenger Agent, Logansport, Crawfordsville & Southwestern; R. H. Harris, Claim Clerk and Real Estate Agent, Canada Southern; J. W. Fortune, Chief Clerk, General Manager's Office, Canada Southern; F. N. Finney, Superintendent, Toledo, Peoria & Warsaw; L. O. Goddard, of legal department, Chicago, Burlington & Quincy; W. R. Donaldson, Attorney, St. Louis, Iron Mountain & Southern; C. K. Garrison, Jr., Claim Agent, Missouri Pacific; J. C. Doane, Assistant General Freight Agent, St. Louis, Kansas City & Northern; A. Kirkland, Claim Clerk, Paducah & Memphis; J. L. Kellogg, General Freight Agent, Davenport & Northwestern; J. E. Lewis, Over and Short



Clerk, Pittsburgh, Fort Wayne & Chicago; H. W. Chandler, Claim Clerk, Pittsburgh, Fort Wayne & Chicago; J. A. McLean, Lost Freight Agent, Cincinnati, Hamilton & Dayton; N. R. Adriance, Claim Clerk, Cincinnati, Hamilton & Dayton; P. H. Dennis, General Agent, Illinois Central; W. P. Griswold, Chief Claim Clerk, Michigan Central; R. H. Harding, Claim Agent, and J. S. Gallagher, General Baggage Agent, Louisville & Nashville and South & North Alabama; W. F. Peterson, of Claim Department, Star Union Line; C. A. Wicker, Assistant General Freight Agent, Baltimore & Ohio; W. Campbell, Claim Clerk, Baltimore & Ohio; A. B. Leet, Assistant General Freight Agent, Chicago, Milwaukee & St. Paul; D. J. Predham, Chief Clerk Claim Department, Chicago & Northwestern; H. B. Adams, Loss and Damage Agent, Chicago, Rock Island & Pacific; C. F. Rand, Chief Clerk General Freight Department, Milwaukee, Lake Shore & Western.

A committee on the order of business was appointed, consisting of Messrs. Head, O'Grady, McCormick, Chandler, Darrach, Griswold and McFadden.

Messrs. Goddard, Smith, Kellogg, Harris, Doane, Kirkland, and Walker were named a Committee on Permanent Organization.

A letter was read from General Freight Agent A. Pope, of the Atlantic Coast Line, approving the plan of organizing.

General Manager J. Hickson, of the Grand Trunk Road, in a communication, said: "I sympathize wholly with the objects of the meeting proposed, and I will instruct the Grand Trunk Company's agent to attend the meeting."

I shall be very happy indeed to forward particulars of our methods of dealing with claims, etc., if those present at the meeting proposed to be held on the 15th proximo should deem such information of any value."

The Special Committee on Permanent Organization was adopted as follows: President, J. C. Doane; Vice-President, E. Darrach; Secretary, N. R. Adriance. The meeting then separated into two sections and considered respectively matters pertaining to freight, and matters pertaining to personal injury and miscellaneous claims. The various points discussed came under the following heads:

The manner of locating apparent losses and damage to through freight.

The best manner of defeating unjust claims, and determining what evidence is proper to justify payment of such claims in order to prevent lawsuits.

A more perfect system of record of seals on through-line cars at connecting points.

The best means of detecting freight thieves.

What rule shall be adopted relative to the necessary papers for adjusting overcharges.

Among the speakers were Messrs. Smith, Rogers, Darrach, McGuinness, Doane, McLain, Dennis, Griswold, Harding, Peterson, Leet, McCormick, Pridham, Adams.

During the second day's session, Mr. E. Darrach, of the Philadelphia & Reading, the Vice-President, occupied the chair.

The forenoon was spent in comparing all kinds of blanks pertaining to the claims department and in discussing the best system of recording claims.

Resolutions were adopted recommending that original bills of lading and original freight bills be required with claims; also that claims should be recorded in the name of consignee.

Nearly all present took part in these discussions.

In the afternoon, the first order of business was dispatched by fixing upon the Planters' Hotel, St. Louis, and Oct. 15, next, as the place and time for the next meeting.

The claim agents, or persons interested in claims, residing in St. Louis, were made a Committee of Arrangements, with Mr. J. J. Rogers as Chairman, to prepare subjects for discussion, and appoint the opening speakers, some difficulty having been experienced in this latter regard at this meeting.

Arrangements were made to exchange blanks for the benefit of those requesting them.

The president, Mr. J. C. Doane, was requested to issue an address of invitation to the railroad managers, that they would attend the next meeting themselves or send representatives.

The department of claims, other than those arising in the freight business, held a separate meeting, as on the first day. It was presided over by Mr. F. N. Finney, General Superintendent of the Toledo, Peoria & Warsaw road. The discussion was upon the following subjects: Stock killed by Locomotives, Damages by Fire, Stolen Baggage, Taxes and Law-suits, Cost of Medical Services, Pretended Injuries, etc., etc. Papers on these subjects will be prepared and read at the next meeting by C. K. Garrison, Jr., of the Missouri Pacific; R. A. Abbott, Michigan Central; R. F. Harris, Canada Southern; C. D. Roys, Lake Shore & Michigan Southern, and W. R. Head, Illinois Central.

## ELECTIONS AND APPOINTMENTS.

**American Society of Civil Engineers.**—The November Transactions of this Society announces the following additions to the list of members: Charles O. Brown, Engineer Passaic Rolling Mill Co., No. 138 Chamber street, New York, promoted from Junior Member; Frederick W. Clarke, Chief Engineer South Chicago Pumping Works, Chicago, made Member; Alfred G. Compton, Professor of Applied Mathematics, College of the City of New York, made Associate; Thomas H. Johnson, No. 64 North High Street, Columbus, O., made Member; Charles W. Raymond, Assistant Engineer, Department of Docks, New York, made Junior; Arthur F. Wrotnoski, New Orleans, made Member.

**Bald Eagle Valley.**—At the annual meeting in Lock Haven, Pa., Jan. 14, the following were elected: President, L. A. Mackey; directors, A. G. Curtin, James Gamble, C. A. Mayer, A. C. Noyes, Thomas A. Scott, Wm. P. Wilson; Secretary and Treasurer, Wm. P. Wilson. The road is leased to the Pennsylvania.

**Central Vermont.**—It is stated that Col. George W. Bentley has finally agreed to withdraw his letter of declination and to accept the position of Vice-President and General Manager of this company. It is understood that he is to be absolutely at the head of affairs so far as the management and operation of the lines worked by the company are concerned, and to be responsible only to the board of directors.

**Chicago & Evanston.**—At the annual meeting in Chicago, Jan. 14, the following directors were chosen: E. Buckingham, George L. Dunlap, W. C. Goudy, F. S. Howe, V. C. Turner.

**Cincinnati, Sandusky & Cleveland.**—At the adjourned annual meeting in Sandusky, O., Jan. 16, the following directors (one-third of the Board) were chosen: E. B. Sadler, Sandusky, O.; J. A. Jeffrey, Columbus, O.; John S. Farlow, Isaac D. Farnsworth, Boston. The board elected John S. Farlow President; N. W. Pierce, Vice President; J. L. Moore, Secretary and Treasurer.

**Columbus, Washington & Cincinnati.**—At the annual meeting in Washington Court House, O., Jan. 7, the following directors were chosen: James F. Ely, Alfred McKay, John Minchot, John M. Hussey, Jesse H. Kirk, Frank McKay, T. H. Harris. The board elected James F. Ely, President; Alfred McKay, Vice-President; George F. Robinson, Superintendent and Secretary; Daniel McLean, Treasurer.

**Connecticut River.**—At the annual meeting in Springfield,

Jan. 16, the old board was re-elected, as follows: Daniel L. Harris, Chester W. Chapin, J. M. Spellman, Springfield, Mass.; Oscar Edwards, Northampton, Mass.; W. B. Washburn, Greenfield, Mass.; C. S. Sargent, Brookline, Mass.; E. A. Dana, Boston; S. M. Waite, Brattleboro, Vt.; Roland Mather, Hartford, Conn. The board re-elected Daniel L. Harris, President; Seth Hunt, Secretary and Treasurer; John Mulligan, Superintendent.

**Dayton & Southeastern.**—The new board has elected Daniel E. Mead President, and John Little Vice-President.

**Dayton & Union.**—At the annual meeting in Dayton, Jan. 15, the following directors were chosen: J. H. Devereux, H. B. Hurlburt, H. H. Poppleton, Cleveland, O.; John McDaniel, G. W. Rogers, Preserved Smith, Dayton, O.; Henry Lewis, R. M. Shoemaker, F. H. Short, Cincinnati. The board re-elected John McDaniel President; J. H. Miller, Secretary and Auditor; G. W. Rogers, Treasurer; C. C. Gale, Superintendent.

**Delaware.**—At the annual meeting in Dover, Del., Jan. 10, the following directors were chosen: Samuel M. Felton, Isaac Hinkley, Andrew C. Gray, Joseph Bringham, Charles Warner, Edward Bringham, Jr., Isaac Jump, Manlove Hayes, Henry B. Fiddeman, Alexander Johnson, James J. Ross, Albert Curry, J. Turpin Moore. The board re-elected S. M. Felton President; Manlove Hayes, Secretary and Treasurer.

**Illinois Central.**—Mr. Joseph F. Tucker, heretofore Master of Transportation, will hereafter be known as Traffic Manager. The new title is thought to describe more accurately the duties of the position. This is a very common title in England, where it is applied to the chief of all the commercial departments, and the recent organization of the New York Central & Hudson River provides an officer (Mr. J. H. Rutter) with the same title and duties.

**Illinois & St. Louis.**—At the annual meeting in Belleville, Ill., recently, the following directors were chosen: Russell Hinkley, George Swiger, B. F. Switzer, G. A. Koerner, Jefferson Rainey, J. B. Bentcher, Belleville, Ill.; Thomas Winstanley, W. E. Richardson, East St. Louis, Ill.; Adolphus Meier, N. Schaefer, J. W. Branch, R. Sellow, R. Campbell, S. M. Holliday, James Clark, St. Louis. The board elected J. W. Branch, President; N. Schaefer, Vice-President.

**Jersey Shore, Pine Creek & Buffalo.**—At the annual meeting in Coudersport, Pa., Jan. 14, John S. Ross was chosen President, with the following directors: Arthur G. Olmstead, Arch. P. Jones, Charles H. Armstrong, Pierre A. Stebbins, Jr., Wm. K. Jones, D. C. Larrabee.

**Junction & Breakwater.**—At the annual meeting in Milford, Del., Jan. 14, the following directors were chosen: C. C. Stockley, B. Burton, J. W. Causey, H. Hickman, E. D. Hitchens, N. S. McCready, Capt. Bodine, Thomas Baumgardner, G. K. Reed. The board met subsequently, when the following officers were elected: President, N. S. McCready, New York; Secretary, J. Y. Foulk, Milford; Treasurers, W. T. Vauls, Milford; General Freight and Passenger Agent, A. Brown; Superintendent, Thomas Groom; Assistant Secretary, W. H. Stanford.

**Lake Shore & Michigan Southern.**—Col. A. M. Tucker has been appointed Superintendent of the Michigan Division.

**Lehigh & Eastern.**—At the annual meeting, Jan. 14, the following were chosen: President, Charles F. Childney, Easton, Pa.; Directors, Jacob Kleinhaus, John C. Wallace, Milford, Pa.; Charles Burnett, Wm. Davis, A. F. Gidman, Stroudsburg, Pa.; Philip F. Fulmer, Dingman's Ferry, Pa.; S. P. Kase, Philadelphia; Peter F. Billings, Elizabeth, N. J.; Albert G. Strong, Little Falls, N. Y.; Chas. L. Clark, John Hoey, Edward P. Wesley, New York.

**Lehigh Valley.**—The board has re-elected Charles Hartshorne Vice-President; Lloyd Chamberlain, Treasurer; John R. Fanshawe, Secretary; Israel W. Morris, Assistant Secretary.

**Montreal, Portland & Boston.**—At the annual meeting in Montreal, Jan. 16, there was a split as explained elsewhere and two boards were elected. The Gulf or seceding board elected E. H. Goff President; W. W. Lynch, Vice-President; F. M. Lowden, Secretary and Treasurer.

The Passumpsic party elected the following directors: S. F. Willett, T. W. Ritchie, Emmons Raymond, Lucius Robinson, R. N. Hall, Charles Gill, S. R. Whitman. This board elected S. F. Willett President.

**Mount Pleasant & Broad Ford.**—At the annual meeting held Jan. 21, the following were elected: President, Charles Donnelly, Pittsburgh; directors, Wm. King, Jr., Wm. Keysey Mendes Cohen, Hugh Sisson, Charles Webb, Baltimore; Geo. R. Dennis, Frederick Md.; E. K. Hyndman, Connellsville, Pa.; Daniel Shoop, Wm. Baldwin, G. B. Rathoun, J. B. Washington, Pittsburgh; Secretary and Treasurer, N. McCullough. The road is leased to the Baltimore & Ohio.

**Mount Sterling.**—At the annual meeting recently, the following directors were chosen: J. M. Bent, N. E. Shawan, J. Q. Ward, W. West, Cynthiana, Ky.; C. J. Glover, O. S. Tenney, Mount Sterling, Ky.; J. M. Van Arsdale, Frenchburg, Ky. The board elected J. M. Bent, President, J. W. Jordan, Secretary.

**New Haven & Northampton.**—The board has re-elected Charles N. Yeamans President and Superintendent; George St. John Sheffield, Vice-President; Edward A. Ray, Secretary and Treasurer.

**New York Central & Hudson River.**—Mr. E. Frisbie has been appointed General Coal Agent. He was for many years in the employ of the Erie.

**Ohio Railroad Commissioner.**—This office seems to be a difficult one to fill. Gov. Young, the retiring Governor, first nominated Mr. L. G. Delano, the former Commissioner, for another term. Mr. Delano declined, and Gov. Young then nominated Chauncey Newton, Columbus correspondent of the Cincinnati Enquirer, for the office. The Senate took no action, however, and the new Governor, Mr. Bishop, last week withdrew Mr. Newton's name and nominated Mr. Wm. Bell, Jr., of Franklin. He has not yet been confirmed. The Ohio Commissioners are changed too often to have time to learn their business, but they have had sense enough to retain the same Chief Clerk, Mr. Chas. T. Flowers, so that the work goes on about the same, who ever is made Commissioner.

**Peach Bottom.**—At the annual meeting in York, Pa., Jan. 14, C. R. McConkey was chosen President, with the following directors: W. Latimer Small, Michael Schall, Wm. Wallace, A. C. Manifold, John Humphrey, W. G. Ross, Rev. Samuel Dickey, John A. Alexander, R. B. Patterson, C. H. Stubbs, J. Primrose Ambler, Isaac Bradley.

**Philadelphia & Erie.**—The Philadelphia City Council has elected George W. Fox, E. A. Gaskill and Ferdinand Doebley city directors in this company for the ensuing year.

**Portland & Ogdensburg.**—At the annual meeting in Portland, Me., Jan. 15, the old board was re-elected, as follows: S. J. Anderson, J. P. Baxter, H. N. Jose, W. F. Milliken, W. L. Putnam, R. M. Richardson, J. S. Ricker, W. W. Thomas, Jr., S. Waterhouse, Portland; Joel Eastman, Conway, N. H. The board re-elected S. J. Anderson, President; Charles H. Foye, Clerk; John W. Dana, Treasurer.

**Sabine Pass & Northwestern.**—At the annual meeting, held

Jan. 10, the following directors were chosen: J. Burwell, H. J. Snow, James Orr, J. R. Jones, A. W. Acheson, J. M. McDonald, Henry Erwin. The board elected J. Burwell, President; H. J. Snow, Vice-President; James Orr, Secretary; J. Bennett, Treasurer. Offices at Laurence, Kaufman County, Texas.

**Sandusky, Mansfield & Newark.**—At the annual meeting in Sandusky, O., Jan. 17, the following directors were chosen: A. H. Moss, A. C. Moss, J. O. Moss, E. B. Sadler, Sandusky, O.; H. B. Curtis, Mt. Vernon, O.; John Gardiner, Norwalk, O.; L. J. Tracy, Mansfield, O.; C. H. Kibbler, W. C. Quincy, Newark, O. The road is leased to the Baltimore & Ohio.

**Scioto Valley.**—At the annual meeting in Columbus, Jan. 10, the following directors were chosen: Wm. Manypenny, E. T. Mithoff, William A. Platt, F. C. Sessions, Columbus, O.; M. Boggs, Chillicothe, O.; George Davis, Portsmouth, O.; Wm. Bingham, S. A. Fuller, Cleveland, O.; H. Toland, London. The board elected E. T. Mithoff, President; Wm. Manypenny, Vice-President; George D. Chapman, General Manager; J. P. Curry, Secretary and Auditor; F. C. Sessions, Treasurer; C. O. Hunter, Attorney.

**Troy & Boston.**—Mr. Wm. H. Vanderbilt has been elected a director of this company.

**Union Stock Yard & Transit Co.**—At the annual meeting in Chicago, Jan. 16, the following directors were chosen: J. C. McMullen, John Newell, Marvin Hughtitt, Hugh Riddle, J. M. Walker, W. K. Ackerman, Chicago; H. B. Ledyard, Detroit; J. N. McCullough, Pittsburgh; Nathaniel Thayer, Jr., Boston. The board re-elected J. M. Walker President; John B. Sherman, General Superintendent; George T. Williams, Secretary and Treasurer.

**Valley of Virginia.**—Mr. Wm. Keyser has been chosen President pro tem., in place of Mr. P. P. Pendleton, deceased.

**Worcester & Nashua.**—At the annual meeting in Worcester, Mass., Jan. 17, the following directors were chosen: Francis H. Kinnicut, Stephen Salisbury, Francis H. Dewey, Isaac Davis, J. Edwin Smith, Worcester, Mass.; Thomas Chase, Calvin B. Hill, Nashua, N. H.; Charles H. Waters, Groton, Mass.; John D. Bryant, Boston.

**Woodstock.**—The following officers have been elected for the ensuing year: President, A. G. Dewey; Clerk, L. O. Greene; Treasurer, F. W. Clark. Offices at Woodstock, Vt.

## PERSONAL.

—Mr. Frank A. McKean, of Nashua, the Democratic candidate for Governor of New Hampshire, is a director and Assistant Treasurer of the Nashua & Rochester Railroad Company.

—Mr. Benjamin E. Bates died at his residence in Boston, January 14, in the 70th year of his age. Mr. Bates had been a director of the Union Pacific Railroad Company for several years and was for a long time President of the Bank of Commerce in Boston.

—Mr. Oscar F. Davis, for seven years Land Commissioner of the Union Pacific Railroad, has resigned that position.

—Mr. Lewis Viele, late General Freight Agent of the Chicago, Rock Island & Pacific, is about to enter the commission business in Chicago.

## TRAFFIC AND EARNINGS.

**Railroad Earnings.**—Earnings for various periods are reported as follows:

Year ending Oct. 31:	1876-77.	1875-76.	Inc. or Dec.	P. c.
Delaware.....	\$419,806	\$392,079	Inc..	\$27,727 7.1
Expenses.....	293,864	274,455	Inc..	19,409 7.1
Net earnings.....	\$125,942	\$117,624	Inc..	\$8,318 7.1
Earnings per mile.....	4.983	4.654	Inc..	.329 7.1
Per cent. of expenses.....	70.00	70.00		
Junction & Brkwa'r	67,920			
Expenses.....	42,051			
Net earnings.....	\$25,869			
Earnings per mile.....	1.698			
Per cent. of expenses.....	61.91			
Year ending Dec. 31:	1877.	1876.		
Bur. Cedar Rap. & Northern.....	\$1,249,881	\$1,128,071	Inc..	\$121,810 10.8
Net earnings.....	413,284	258,228	Inc..	155,056 60.1
Per cent. of expenses.....	66.93	76.98	Dec..	10.05 13.1
International & Great Northern.....	1,558,978	1,441,805	Inc..	117,173 8.1
Nashville, Chatta. & St. Louis.....	1,749,208	1,697,917	Inc..	51,291 3.0
Net earnings.....	702,587	689,612	Inc..	12,975 9.8
Per cent. of expenses.....	59.81	62.25	Dec..	2.44 3.9
New Jersey Midland.....	685,087	696,914	Inc..	11,827 2.7
Net earnings.....	142,531			
Per cent. of expenses.....	79.20			
Pacific & Memphis	189,583	207,473	Dec..	17,890 8.6
St. Louis & South-eastern.....	1,068,404	1,060,744	Inc..	7,650 0.7
Ten months ending Dec. 31:				
Scioto Valley.....	\$116,853			
Net earnings.....	58,377			
Per cent. of expen.....	50.04			
Month of October:				
Denver & Rio Grande.....	\$76,434			
Net earnings.....	34,368			
Per cent. of expenses.....	55.04			
Month of December:				
Bur. Cedar Rapids & Northern.....	\$129,554	\$90,488	Inc..	\$39,066 43.2
Int. & Great North'n	201,258	213,918	Dec..	12,660 5.9
Nash., Chat. & St. L.	163,064	139,237	Inc..	23,827 17.1
New Jersey Midland.....	50,853	52,417	Dec..	1,564 3.0
Paducah & Elizabeth.....	30,437			
Paducah & Memphis.....	19,432	17,104	Inc..	2,328 13.6
St. L. & Southeastern.....	91,303	91,531	Dec..	228 0.2
First week in January:	1878.	1877.		
Denver & Rio Grande.....	\$11,531			
Second week in January:				
Chic., Mil. & St. Paul.....	\$144,000	79,052	Inc..	64,948 82.1
Michigan Central.....	118,085	107,731	Inc..	10,354 10.2
St. L., Iron Mt. & So.....	101,600	95,872	Inc..	5,728 6.0
Week ending Jan. 11:				
Gt. Western, of Can.....	\$85,005	\$61,674	Inc..	\$23,331 37.8
Week ending Jan. 12:				
Grand Trunk.....	105,835	\$149,580	Inc..	\$16,255 10.9

**Grain Movement.**—Receipts and shipments of grain of all kinds for the week ending Jan. 12 are reported as follows:

	1878.	1877.
Northwestern receipts.....	1,987,853	2,391,038
shipments.....	1,185,085	908,682
Atlantic receipts.....	2,662,375	1,546,128

There is a gain in the receipts at Northwestern markets as compared with previous weeks of this winter, and for the corresponding week they have been exceeded but three times in the history of the grain traffic—1877, 1874 and 1872.

The shipments of these ports are the largest for four years. The receipts at the seaboard are the largest on record for the second week of January. Of the latter, 42.6 per cent. was at New York (an unusually large proportion for



this time of year), 18.4 at New Orleans, 15.5 at Philadelphia, 13.2 at Baltimore, 7.2 at Boston, and 3.1 at Portland. The New Orleans receipts are most notable, being the largest on record for years, and more than three times its average weekly receipts in 1877.

**Coal Movement.**—Anthracite coal tonnage reported for the week ending Jan. 12 is as follows: 1878, 252,323 tons; 1877, 284,078 tons; decrease, 31,755 tons, or 11.2 per cent. The tonnage of the Clearfield Region for the full year is reported as follows: 1877, 1,372,153; 1876, 1,218,861; increase, 153,292 tons, or 12.6 per cent.

The anthracite coal combination is now fully formed. The trade will be under the management of a Board of Control, which will hold monthly meetings, in New York and Philadelphia alternately. The board is composed of Thos. Dickson, for the Delaware & Hudson Canal Company; F. B. Gowen, Philadelphia & Reading; Samuel Sloan, Delaware, Lackawanna & Western; George A. Hoyt, Pennsylvania Coal Company; A. J. Cassatt, Pennsylvania Railroad; Francis S. Lathrop, Central Railroad of New Jersey; E. W. Clark, Lehigh & Wilkesbarre Coal Company; Dr. Linderman and E. P. Wilbur for the Lehigh Valley Company and the operation of the Lehigh region. Mr. Dickson is Chairman and Mr. Gowen Secretary of the board.

It has been reported that, although the combination is considered binding by all parties, no formal agreement has been signed, for certain legal reasons. The apportionment adopted was noted last week.

In consequence of this combination, several of the companies have raised prices an average of 50 cents per ton, and the rest will probably take the same action. There will be a short suspension of shipments on the Lehigh Valley road and also on the Lehigh Division of the New Jersey Central.

#### THE SCRAP HEAP.

**Railroad Manufactures.**—The Cleveland, O., Rolling Mill Co., at its recent annual meeting re-elected the old directors as follows: A. B. Stone, Henry Chisholm, H. B. Payne, J. H. Wade, D. P. Eells. At a meeting of the directors the following officers were chosen for the ensuing year: President, A. B. Stone; Vice-President and General Manager, Henry Chisholm; Secretary, E. S. Page.

The Clove Furnace at the Greenwood Iron Works, in Orange County, N. Y., is reported as having been in blast for six years and 33 weeks on Jan. 1, and is still in good condition and working well. It uses anthracite coal as fuel. Tecumseh Furnace, at Tecumseh, Ala., had been in blast 30½ months on January 1, using charcoal as fuel, and will continue in blast.

The Peckham Iron Co. is now building works at Kimmswick, Jefferson County, Mo., for the manufacture of iron by Peckham's patented process.

The Pennsylvania Steel Co. has an order for 600 tons of steel street rails to go to Rio Janeiro.

The Boston & Albany car shops at Springfield are at work on two new postal cars 55 ft. 7 in. long for the new fast mail line between New York and Boston. The New York, New Haven & Hartford shops at New Haven are building two more of the same pattern. Both shops are pushing the work as fast as possible, as the cars must be ready by Feb. 1.

The Boston & Albany Company is to try 25 of the iron flat cars built by Osgood, Bradley & Co., at Worcester, Mass. The Boston, Clinton, Fitchburg & New Bedford has also put several in use.

F. E. Canda & Co., of Chicago, have received their discharge in bankruptcy and the firm is finally dissolved.

The Rogers Locomotive Works, at Paterson, N. J., last week shipped a heavy engine to Cuba. The works have received an order for six locomotives to go to New Zealand.

The Passaic Rolling Mill Co., at Paterson, N. J., besides other work, is building two highway bridges to go to Costa Rica.

The car works of John L. Gill at Columbus, O., are building 50 coal cars for W. P. Rend & Co., of Chicago.

The King Iron Bridge Co., at Cleveland, O., has re-elected Zenas King President; James A. King, Vice-President; H. B. Gibbs, Secretary.

R. Comins, of Troy, N. Y., has recently completed several Howe truss bridges for the Rochester & State Line road.

The Wood & Light Machine Co., at Fitchburg, Mass., recently shipped to the Chicago, Burlington & Quincy a heavy quaternary machine for setting locomotive crank pins. The machine weighs about eight tons.

**Notes.**—The Middletown (N. Y.) Press tells of a conductor in that town who cleared out his desk the other day and burned a lot of waste paper, but afterwards found that he had destroyed an envelope containing a lot of coupons which he had cut off and laid aside for collection. As all the railroads running into Middletown are bankrupt, it does not seem possible that any of their conductors should be bloated bondholders, which throws a doubt over the story.

A correspondent of a North Carolina paper writing of a new railroad says that in June next the mountain region of that State will "be in communication with the rest of the world by railroad for the first time in the last 5,000 years." Unfortunately he neglects to say anything about the railroad which ran there 5,000 years ago, or why it was abandoned, which would have been interesting information.

By-and-by car builders will find out that a flat or concave seat is more comfortable than a convex one, and in ten years or so they may build seats which conform to the human anatomy. Car builders are conservative folk in minor matters.

"Yours is a very perilous life," remarked a lady passenger to the conductor; "doesn't it require a great deal of courage on your part?" "Oh, yes, ma'am," replied the conductor, as he gently but firmly charged her 10 cents extra for neglecting to get a ticket. "Yes, ma'am; none but the brave deserve the fare."—*Exchange.*

An exchange says that in view of the fact that the law in Missouri limits the amount that can be recovered for damages for the death of a man to \$5,000, while verdicts for \$10,000 and \$15,000 have recently been given for the loss of an arm or a leg, the Missouri companies are considering whether it would not be best to issue orders to kill everybody when an accident occurs. The times are hard and economy must begin somewhere.

A disgusted chief engineer of a lately completed road remarks, in language more forcible than polite: "If the Devil in hell had had a construction committee, he would not have succeeded as well in building his laboratory." We hope none of our readers will repeat his language, but doubtless many of them will appreciate the sentiment.

An Illinois editor, who does not now live on the line of the Chicago & Northwestern, but is about to move there, we understand, says: "The Northwestern Railroad Company is offering unusual inducements to married men to locate along the line of that road. It has just paid a Mr. W. P. Conner \$3,000, whose wife was thrown under a freight train recently and killed."

**New Style of Pass.**—The following is a specimen of the new style of railroad pass:

PENNSYLVANIA RAILROAD TRACK.  
1878—Complimentary—1878.

This pass entitles the bearer, John Jones, Esq., to walk

carefully along the track in either direction, at his or her own risk. Not transferable. A word to the wise: "Skip out of the way when you hear a train coming."—*Exchange.*

**Recent Sales of Rails.**—The *Engineering and Mining Journal* says: "We have again a very large business to report. The Erie Railway has purchased 25,000 tons of steel rails at \$41.75 per ton, delivered on the line of its road. The order was given to Troy, Bethlehem and Harrisburg mills. It is said that the Scranton mill made a bid fully 75 cents per ton less than the price at which contracts were awarded, and although it makes an unexceptionable quality, from some cause it did not get a portion of the order. In addition to this we are reported an additional purchase by the Pennsylvania Railroad Company, of 10,000 tons of steel rails, and purchases by sundry Western roads, amounting to 13,500 tons more. The important business so far has been on the basis of \$40 per ton at mill. There is an inclination to firmness in prices, which would seem natural from the large orders already booked."

**Tramps.**—Seven tramps boarded a freight train at Geddes (New York Central Railroad) and overpowered the train hands, attempting to put the conductor and brakeman off. A severe fight followed, but they were finally driven off. They stoned the caboose. The Syracuse police were telegraphed, and with the aid of a special engine the rascals were overhauled. Two were in a freight car drunk, two were fighting and two ran off. All were captured. They gave their names as Charles Shaver, Thos. McCarthy, James Gordon, Thomas Berry and James Harley. They were held under chapter 261, section 1 of the laws of the State of New York, which prohibits the willful throwing of any stone or missile at any train on any railroad, and provides a punishment on conviction thereof of a fine not exceeding \$1,000, and imprisonment not exceeding ten years, or both. Railroad conductors should avail themselves of the law which makes them special policemen, and give such scoundrels what they deserve.

The Delaware, Lackawanna & Western road is greatly bothered by tramps. A whole battalion of them got on a freight train north of Earlville, yesterday, and the conductor experienced considerable difficulty in putting them off. —*Utica Herald, Jan. 16.*

**A Railroad Velocipede.**—The *Golden (Colorado) Globe*, tells the following little story: "Mr. Johnson, a traveling musician, being in Garland, Colorado, and anxious to depart, manufactured a railroad velocipede with which he proposes to travel into Texas. Having become possessed of two two-wheeled velocipedes, such as were in common use a few years ago, he proceeded to fasten them together to run on a railroad. Wooden axles were constructed so that the machine could be adapted to any gauge of track, a broader tread was placed on the wheels, to which were added flanges made of whiskey barrel hoops, levers were fitted to give means for using the hands as well as the feet to gain motive power; the whole arrangement was given a coat of red paint, and it was placed on the track at Garland ready for service. The machine weighs about forty pounds, and is easily handled. The operator sits on a seat resting across what were the two seats of the old velocipedes."

"Johnson mounted his novel traveling apparatus at Garland, and arrived here without accident, having made the trip at the rate of about fifteen miles per hour. He remained in this city a day or two, and altering the gauge of his car to suit that of the Atchison, Topeka & Santa Fe road, he started out on Friday afternoon for the East. Our informant tells us that he saw Johnson near Goldsmith's ranch, and tried to keep up with his car on a good horse, but the animal was soon distanced. The engineer of the eastern-bound passenger train met Johnson at Apishapa yesterday."

"Johnson is an old railroad man, and always provides himself with a time card, so that he can keep out of the way of the regular trains. His apparatus is so light that it can be moved from the rails in a moment."

**An Eventful Trip.**—Passing by a group of Eastern Division brakemen, we overheard the following: "Twas one of them air coldest nights last winter; we was goin' east with full train freight. 'Ras wouldn't turn us, so we filled up at Turners. Joppy with the 346 was pullin' us, and the old man was mad, you bet, cose he couldn't git turned, and the way he hosed 'em down through the Valley was a caution. We was just chippin' down around 'Gusty Bridges when whoop! says Joppy. Whoop! says Joppy ag'in, an' I node by the way she screeched the old man 'ed seen a tail light. Well, I got up just as fast 's I could, but bein' haf froze I couldn't git 'round very fast, and afore I'd got my brakes on, Joppy harnessed her and put her way down in the back notch, and she chawed 'round there on sand for about five minutes, now I tell yer, but 't was no use, she stuck her nose under Billins's caboose and jist histed it off the rails, and w'en his train surged ahead ag'in it dropped rite back ag'in on the rails all ko-rect. Billins's greaser he got scart and run out on the hind end and like a darned fule jumped rite off without lookin', rolled down the bank and broke his toun', besides skinnin' his nose 'til it looked like a peeled pertater. You'd orter heard Joppy sware. Gosh! how he ripped and tore 'round, and bimby, w'en I went over on the ingin to warn my toes, Joppy says, says he, 'Now we'll have to foller that d—d 297 all the way to Jersey, and I'm consarned, says Joppy, if I wouldn't ruther foller a nold cow.' Well, we poked and poked along and pulled out a drawhead down 'round West Paterson, and finally got to Jersey tired out, and it seems to me that air was the durndest trip I ever made." —*Port Jervis Gazette.*

**Engineers' Club of Philadelphia.**—The Engineers' Club of Philadelphia has been organized by the engineers of that city for their mutual assistance and improvement, and will hold regular meetings on the first and third Saturdays of each month. Professor Lewis M. Haut is President of the Club; Coleman Sellers, Jr., Vice-President, and Charles E. Billing, Secretary and Treasurer.

#### OLD AND NEW ROADS.

**Alabama & Chattanooga.**—In Washington, Jan. 21, the United States Supreme Court gave its decision, affirming the decree of the Circuit Court foreclosing the mortgage of the bondholders and removing the cloud from the title caused by the bankruptcy of the company, the seizure of its property by the Government of the State of Alabama, and the sale thereof by the assignee in bankruptcy. The Court is satisfied from an examination of the grounds upon which the objections to the decree rest, that they show no error therein. Justice Bradley delivered the opinion.

**Atlantic & Great Western.**—In the Court of Common Pleas at Akron, O., Jan. 21, a decision was given as to the confirmation of the contract recently made by the Receiver with the Pittsburgh & Lake Erie Railroad Company. The confirmation was resisted by the Franco-Egyptian Bank and Messrs. Bischoffsheim & Goldsmith. The first ground of objection was that the receiver of an insolvent company could not enter into such a contract. The Court held that the receiver of a great corporation was essentially different from the passive receiver of an insolvent company who simply collects and holds money. Moreover the con-

tract was not made by the receiver alone but by the officers and directors of the Atlantic & Great Western and Cleveland & Mahoning companies. It was also held that the manner in which the Atlantic & Great Western obtained possession of the Pennsylvania & Ohio Canal bed, over which the Pittsburgh & Lake Erie is to have the right of way, was legal. Had it been put up at auction the Pennsylvania would likely have bid much more than it was worth to keep it away from the Atlantic & Great Western; but the full value was paid for it, as had been proven by competent testimony. It was further held that the contract would only last during the receivership, and upon the sale of the Atlantic & Great Western it would be free from the provisions of the contracts made by the receiver. It had been shown that great advantages would accrue to the Atlantic & Great Western under the proposed contract, so that no valid objection had been raised, hence the Court approved and confirmed the contract. The defense took exceptions to the ruling of the Court in regard to the power of the Receiver to become a party to the contract.

**Baltimore & Drum Point.**—This company has petitioned the Baltimore City Council to grant the endorsement of the city upon its bonds, to the extent of \$500,000, the guarantee to be given upon the completion of each section of the road as follows: Upon the completion of the first 23¼ miles to the junction on the Annapolis & Elkridge road eight miles from the State capital, to guarantee \$200,000 of the bonds; upon the completion of 48½ miles to Mount Zion, to guarantee \$150,000, and upon the completion of the whole road, 76 miles, to Drum Point, to guarantee an additional \$150,000, making \$500,000 in all. The endorsement has been asked for before, but not granted. It is not likely that the road will be built unless the petition is granted.

**Boston & Poughkeepsie.**—An organization by this name has petitioned the Massachusetts Legislature for a loan of the credit of the State to the amount of \$1,000,000, to be secured by a first mortgage on the projected road.

**Buffalo, New York & Erie.**—Notice is given that the old first mortgage securing the bonds which matured Dec. 1, 1877, has been satisfied and discharged, so that the only mortgage debt now outstanding consists of the first-mortgage renewal bonds due in 1916.

**Burlington, Denmark & Keosauqua.**—A company by this name has been organized to build a railroad from Burlington, Ia., westward through Denmark to Keosauqua. The distance is about 50 miles, and the capital stock is to be \$500,000. It is proposed to build on the line originally surveyed for the Burlington & Southwestern road. The towns along the line are to be asked to vote a 3 per cent. tax in aid of the road.

**Camden & New York.**—A company by this name has been organized to build a railroad from Camden, N. J., north-east to a point on Raritan Bay in the town of South Amboy. The distance is 62 miles and the capital stock is to be \$1,500,000. The object of the organization is not clear, as the line must be parallel and close to that of the old Camden & Amboy.

**Cheraw & Chester.**—This company has track laid from Chester, S. C., eastward 10 miles, and expects to have 13 miles laid by March 1. The road is graded from Chester east to Lancaster Court House, 30 miles, and about \$125,000 has been expended on this division. On the eastern section from Lancaster to Cheraw, 55 miles, about \$10,000 has been spent.

**Chicago, Burlington & Quincy.**—Bids will be received until Jan. 29 for the sale to the trustees under the mortgage of 7 per cent. land bonds of the Burlington & Missouri River Railroad Company to the amount of \$311,650.25. Bids should be addressed to John N. Denison, Assistant Treasurer, Boston.

**Chicago & Eastern Illinois.**—This road has begun to run a through car between Chicago and St. Louis. The car is transferred to the Wabash at Danville, Ill., and goes to St. Louis over that line.

Arrangements are also being made for a through line between Chicago and Nashville, Tenn., by way of Danville, Terre Haute and Evansville.

**Chicago & Illinois River.**—A Chicago dispatch of Jan. 21 says: "A creditor's bill was filed to-day against the Chicago & Illinois River Railroad Company to satisfy a judgment for \$14,670, obtained in November, 1875, against the company in favor of Frisbie & Rappelye. Judge Williams appointed Thomas C. Hill Receiver under a bond for \$35,000. The Judge also entered an order directing the Receiver to take possession of the road and all its franchises. He is authorized to collect and pay claims and defend and prosecute suits. The company, or whoever may have possession of its property, is directed to surrender the same to the Receiver. The road is 24 miles long, from Joliet, Ill., to the Mazon River, and is operated by the Chicago & Alton, and proceedings in foreclosure were begun some two years ago."

**Chicago, Millington & Western.**—Receiver McArthur reports to the United States Court that this road consists of 11 miles of track extending from Twenty-sixth street in Chicago to Covell's gravel bank. It is lightly and cheaply built and is owned by the contractors who built it. No business was ever done on the road except the hauling of gravel and that is now stopped, the creditors having seized all the equipment. There are unsecured floating debts amounting to \$24,627, and \$409 due for taxes. There are also other claims for construction which are not yet adjusted.

**Chicago & Northwestern.**—This company now works the new Maple River Railway, in western Iowa, 59 miles, and the Menominee River Railway, 26 miles, in the upper peninsula of Michigan, just west of Green Bay. This makes the total worked by the company 2,078 miles, and certainly entitles it to be called one of the greatest of railroad companies. Only the Pennsylvania Company, we believe, in this country operates greater length of road, and the Pennsylvania Railroad Company does not have as much by about 400 miles. The Central Pacific works about the same length as the Chicago & Northwestern.

The Naperville (Ill.) *Clarion* says: "The conductors of passenger trains on the Galena Division of the Chicago & Northwestern Railroad are in a state of great tribulation over the manner in which they are being led to the official guillotine and executed. Some time since the officers of the company determined to purify the service and get rid of the men who had been violating the rules. A strict watch was kept on the Galena Division, where most of the trouble existed, until proof enough was obtained to warrant decisive action."

**Cincinnati & Westwood.**—An indignation meeting of patrons of this Cincinnati suburban road was held last week, and a committee was appointed to draft resolutions expressing the feeling of the meeting. The resolutions as drawn up by the committee set forth that the company solicited subscriptions from parties along the line representing that a narrow-gauge road could be built and operated for very much less than one of standard gauge, and that the subscriptions were needed only to carry the road until its business



could be established and made profitable. Nevertheless the company has made its commutation rates twice as high as those of any standard-gauge road out of Cincinnati and refuses to lower them, although the commuters have offered to pay one-half more per mile than the rates on the other roads. This conduct is denounced as a breach of faith with the subscribers and an injury to the interests the road was expected to serve.

Evidently the narrow gauge in this case is not all that fancy painted it.

**Chicago, Pekin & Southwestern.**—In the United States Circuit Court in Chicago, Jan. 17, Judge Drummond entered an order remanding the foreclosure suit of the Farmers' Loan & Trust Company against this company to the Circuit Court for Grundy County, Ill., where it was originally begun.

**Colorado Central.**—This company has now in operation lines of standard gauge from Golden, Col., to Denver, 16 miles, and from Golden to Cheyenne, 130 miles; narrow-gauge lines from Golden to Black Hawk, 21 miles, and from Forks (13 miles from Golden) to Georgetown, 22 miles, making 136 miles of standard and 43 of narrow-gauge. It has under construction a loop line of standard gauge from Golden to Ralston, 7½ miles, intended to shorten the route from Golden north; a narrow-gauge branch from Golden to Murphy's, 6 miles, and an extension from Black Hawk to Central, 4½ miles. As soon as the weather permits, surveys are to be made for extensions from Central to Caribou, 16 miles, and from Georgetown to South Park, 50 miles.

Of the Georgetown Branch 18½ miles, from Floyd Hill to Georgetown, were opened in August last. On this section the maximum grade is 106 feet per mile. The extension from Black Hawk to Central, now under construction, is very difficult and expensive work. The sharpest curve on this extension is 179 feet radius, and the heaviest grade is 3.4 feet in 100, or 179.52 feet per mile. It is now all ready for the rails.

**Columbus, Washington & Cincinnati.**—This road (originally known as the Waynesville, Port William & Jeffersonville) is now completed from Allentown Junction, O., to Glenwood Station, 18 miles. The company has leased the use of the Dayton & Southeastern road from Allentown Junction to Washington Court House, 11 miles, and is now running regular trains between Washington and Glenwood. The road is to be completed to the crossing of the Little Miami by March 1. The company has now one locomotive, built by Porter, Bell & Co., and has ordered another from W. H. Baily & Co. It has two passenger, 20 box and 6 flat cars.

**Corning, Cowanesque & Antrim.**—Surveys are being made for an extension of the Cowanesque Valley Branch from Elkland, Pa., west by south up the Cowanesque Creek to Westfield, a distance of about 14 miles.

**Denver & Rio Grande.**—This company now operates the following lines:

	Miles.
Main Line, Denver to Garland.....	220.0
Arkansas Valley Branch, Pueblo to Canon City and Coal Mines.....	43.0
Elmoro Branch, Cucharas to Elmoro and Elmoro mines.....	44.5
Total.....	307.5

Of the last named branch 7.8 miles, from Elmoro to the Elmoro mines, was built last year, in addition to the extension to Garland, which we have already noted.

The Auditor's report for the month of October is as follows, covering the whole line, 304 miles:

Freight.....	\$56,008.15
Passengers, mail and express.....	20,260.63
Miscellaneous.....	104.73

Total earnings (\$251.43 per mile).....	\$76,433.51
Expenses (\$4.04 per cent.).....	42,006.00

Net earnings (\$113.05 per mile).....\$34,367.51

The gross earnings include \$1,926.03 from transportation of mails, and \$2,410.04 for troops and Government freight.

**Dakota Southern.**—A report of the business of this road for last year puts the gross earnings at \$207,000, and the net earnings at \$100,000. There were about 22,000 passengers and 48,000 tons of freight carried. The business of the road continues heavy and a large part of last year's crop is still to be moved.

**Eric.**—The New York Supreme Court on Dec. 18 granted a postponement of the foreclosure sale for sixty days, on application of the trustees.

A new suit to set aside the foreclosure and remove Receiver Jewett has been begun. The plaintiffs are a number of stockholders and the complaint in the suit is similar to that in the McHenry suits.

The hearing on the motion to discontinue the Attorney General's suit, in which the Receiver was originally appointed, came up Jan. 18. The new Attorney General stated that he desired to leave the motion entirely to the Court, but the Court required him to decide whether he would oppose the motion or not, and the case was adjourned to Jan. 24.

**Fast Mail Trains.**—The new Eastern fast mail train is to leave New York at 5 a. m., on the New York, New Haven & Hartford road. At New Haven the train will divide, one section going by Springfield and reaching Hartford at 8:45 a. m., Springfield at 10:20 a. m. and Boston at 2:40 p. m. The other section will go by the Shore Line, arriving at Providence 1:15 p. m. and at Boston 3:05 p. m. The mail cars for this train are to be ready about Feb. 1.

**Hanover Junction, Hanover & Gettysburg.**—The Baltimore *Gazette* of Jan. 18 says: "During the present week conferences have been held between Col. Daniel V. Ahl, President of the Harrisburg & Potomac Railroad; Capt. A. W. Eichelberger, President Hanover Junction, Hanover & Gettysburg, Berlin Branch, and Bachman Valley railroads, and John B. Dacy, of Dacy Bros., the Boston railroad builders, which have resulted in contracts being signed with Dacy Bros. for the construction of two connecting roads, one 11 and the other 10½ miles long. The Harrisburg & Potomac Railroad is now in operation from six miles east of Shippensburg to a point on the Dillsburg Branch of the Cumberland Valley road eight miles from Mechanicsburg, and from thence it is to extend to New Cumberland and the Susquehanna. Eighteen miles of road, connecting the Western Maryland, from a point at or near Reisterstown, with the Bachman Valley road, is now under construction, and will be completed by July or August. The remaining links are from Dillsburg Junction, on the Harrisburg & Potomac and Cumberland Valley roads, to York Springs, and thence to the Baltimore & Hanover road at New Oxford. The Hanover Company have agreed to lease the whole line at an annual rental that will pay the interest on the bonds issued for its construction. A bill has passed one branch of the Legislature granting permission to the town of Manchester to subscribe to the extension. When completed the route will bring Baltimore 21 miles nearer to the Cumberland Valley than the present route by rail, and 40 miles nearer than Philadelphia. Engineers are engaged surveying the proposed line, and grading will be commenced in about ten days."

**Indianapolis, Bloomington & Western.**—Receiver Wright reports for the month of December as follows:

Balance, Dec. 1.....	\$75,232.23
Receipts for the month.....	133,626.85
Total.....	\$208,859.08
Disbursements.....	161,178.01

Balance, Jan. 1, 1878.....\$47,681.07

The disbursements were \$27,551.16 in excess of the receipts.

**Lafayette, Muncie & Bloomington.**—Receiver Chapman reports for December receipts amounting to \$34,735.18; disbursements, \$30,174.20; balance, Jan. 1, 1878, \$4,560.98.

**Lehigh & Lackawanna.**—It is said that work is to be begun at once on the extension of this road from the present terminus at Chapman, Pa., northward 10 miles to the Wind Gap. From that point it is to be extended 18 miles to Stroudsburg by the Stroudsburg & Wind Gap Company. It is said that all the money required has been provided, and that the 28 miles from Chapman to Stroudsburg will be finished next summer.

**Lockport & Buffalo.**—The New York Supreme Court, at General Term, has affirmed the order allowing this company to cross the New York Central at Tonawanda, in order to make connection with the Erie there. In consequence of this decision the company will soon resume work on its road.

**Logansport, Crawfordsville & Southwestern.**—Receiver Claybrook reports for the month of December as follows:

Balance, Dec. 1.....	\$8,228.22
Receipts from all sources.....	25,374.03
Total.....	\$33,602.25
Disbursements on all accounts.....	25,063.77

Balance, Jan. 1, 1878.....\$8,538.08

The receipts were \$310.86 in excess of the disbursements.

**Montreal, Portland & Boston.**—At the annual meeting in Montreal, Jan. 16, a split occurred, and two boards of directors were chosen. After the meeting was opened an injunction was served on E. H. Goff and his supporters restraining them from voting upon \$420,000 of stock, which, it is alleged, was issued fraudulently and for the purpose of controlling the election. Mr. Goff then retired and the stockholders elected a board said to be in the interest of the Passumpsic Company, with S. T. Willett as President.

The Goff party organized another meeting and elected a board with E. H. Goff as President. The matter will have to be settled by further litigation.

**Nashville, Chattanooga & St. Louis.**—This company makes the following statement for the half-year ending Dec. 31:

	1877.	1876.	Increase.	P. c.
Gross earnings.....	\$938,216.25	\$821,281.76	\$116,934.49	14.2
Working expenses.....	548,554.84	512,292.13	36,262.71	7.1
Net earnings.....	\$389,661.41	\$309,019.63	\$80,641.78	26.1
Six months' interest on bonded debt.....	219,060.00	219,060.00		
Surplus.....	\$170,601.41	\$89,959.63	\$80,641.78	89.6

The expenses were 58.47 per cent. of gross earnings in 1877, and 62.37 per cent. in 1876. Taxes are included in the expenses.

**New Jersey Midland.**—The earnings of this road for December and the year were as follows:

	December.	Year.
Passengers.....	\$6,218.51	\$137,654.65
Freight and milk.....	42,106.26	470,356.19
Mail, express and miscellaneous.....	2,327.89	77,076.33

Total.....	\$50,852.66	\$685,087.17
Working and terminal expenses.....	41,052.45	542,556.53

Net earnings.....	\$9,800.21	\$142,530.64
Per cent. of expenses.....	80.73	79.20

The Receiver's account for the month was as follows:

Cash on hand Dec. 1.....	\$1,976.68
Road receipts.....	50,852.66
Suspense and loan accounts.....	11,220.55

Total.....\$54,049.89

Road expenses.....\$41,052.45

Construction, equipment and right of way.....4,073.65

Middletown, Unionville & Water Gap.....2,500.00

Montclair & Greenwood Lake terminals.....1,368.92

Discount, interest, insurance, etc., and loan account.....14,348.00

Balance, Jan. 1, 1878.....\$705.87

As compared with 1876 the month shows a decrease in gross receipts of \$1,563.84, or 3 per cent.; the year an increase of \$18,172.92, or 2.7 per cent.

**New York Central & Hudson River.**—Trainmen on the New York Central Division are now required to make their residence at the point where their trains usually lay up at night or at the end of their runs. The object of this is to prevent loss of time and sleep in riding to and from their homes, and to have the men where they can be readily found if wanted suddenly.

A reduction in local freights has been promised to residents on the Harlem Division, especially upon market freights to New York.

A recent order on the Harlem Division requiring conductors on local trains to take up tickets more frequently was the means of detecting many persons who had been in the habit of riding several stations further than their tickets entitled them to, thus practicing a petty fraud upon the company.

**Northern Pacific.**—This company is reported to have recently completed a survey for a branch line from Detroit, Minn., north by west to Pembina, about 170 miles. The object of the proposed branch is to control the trade of the Red River country and to anticipate the St. Paul & Pacific in a connection with the Manitoba Branch of the Canadian Pacific at Pembina.

**Northeastern, of Georgia.**—After long hesitation Gov. Colquhoun of Georgia has decided to put the endorsement of the State upon the bonds of this company to an amount corresponding with the mileage of the completed section of the road. The endorsement was authorized by the Legislature some time ago, but the Governor had intended to withhold it until the meeting of the next Legislature. Finally, however, he agreed to sign the bonds, in order to save the company from embarrassment.

**Ohio & Mississippi.**—Receiver King gives notice that he will pay the coupons on the first-mortgage bonds, which became due July 1, 1877, at the office of the company, No. 52 William street, New York, on and after Feb. 1, 1878. The coupons on bonds held by the trustee for the sinking fund will not be paid. No interest will be paid on the coupons, as the order of the Court reserves for future determination the question of paying such interest. The coupons are to be surrendered and cancelled, but the names of the owners will be taken and reported to the Court as a basis for the calculation of the interest if the Court shall hereafter allow it.

**Pacific Railroads and the Government.**—In answer to the inquiries submitted by Congress, the President has transmitted to that body an opinion of the Attorney General to the effect that under existing laws the Executive has no power to compel the Union Pacific Company to cooperate with the Kansas Pacific on through business. Further legislation will be needed to this end.

**Paulding & Cecil.**—This road is regularly in operation from Paulding, O., north to the Wabash & Erie Canal, a distance of five miles, and is equipped with one engine, three passenger and five freight cars. It is of standard gauge, and is more than earning expenses. An extension of two miles from the canal to the Wabash road at Cecil is ready for the iron. The road has been mortgaged to secure an issue of \$40,000 in bonds.

**Philadelphia, Newtown & New York.**—The track is now laid to Newtown in Bucks County, Pa., 12 miles beyond the late terminus at Fox Chase and 18 miles northeast from the junction with the Pennsylvania Railroad at Erie Avenue station in Philadelphia. The new section of the road opens up a very pleasant section of country, and is expected to have a considerable traffic from the market gardens of Bucks County.

**Pittsburgh, Castle Shannon & Washington.**—The stockholders at a recent meeting voted to adopt the line known as the Kammerer or western route for the extension of the road to Morgantown, instead of the line through Monongahela City. A resolution was passed promising assistance to the building of a branch from Finleyville to Monongahela City.

**Portland & Ogdensburg.**—At a special meeting held in Portland, Me., Jan. 21, a plan was proposed which provides for a reduction of the Portland city mortgage to \$800,000, and the issue of preferred stock for the remaining \$550,000 and for the unsecured debt. It is expected that the road can earn enough to pay interest on the \$800,000 bonds and its own first-mortgage bonds. The control of the property will be transferred to the preferred stockholders until the road can pay them dividends.

**Port Royal.**—In a suit brought by a bondholder on some unpaid coupons in the District Court at Augusta, Ga., judgment has been given against the Port Royal Company as maker and the Georgia Railroad Company as guarantor for the amount of the coupons with interest. The case will probably be appealed.

**Railroad Mail Service.**—Arrangements have been made for a fast mail from New York to Cedar Keys, Fla., by rail, and from that port to Havana by steamer. The rail line will be by Washington, Richmond and the Atlantic Coast Line to Savannah and thence by the Atlantic & Gulf, the Jacksonville, Pensacola & Mobile and the Atlantic, Gulf & West India Transit road to Cedar Keys.

A statement has been compiled from official data in the office of the Railway Mail Service, exhibiting the present extent of the Fast Mail Service. On the 23d of July, 1876, all postal cars were withdrawn from the New York Central & Hudson River Railroad and the Pennsylvania Railroad, the roads claiming that the compensation, which was reduced 10 per cent. was insufficient. Negotiations were immediately begun for the restoration of this service, the Post Office Department presenting, as its principal argument, that something was due to the public from the companies. The Pennsylvania Railroad Company, in December of that year, did reconsider, and placed at the disposal of the Department all facilities it desired on their regular trains, and ran a special train between New York and Philadelphia for certain early service, which could not be performed in any other way. Cars of this company are now running from New York to St. Louis, Cincinnati and Washington, on five trains outward daily, and seven trains inward daily, with connections at Pittsburgh for Chicago by postal car. Negotiations were kept up continually with the New York Central & Hudson River Railroad Company, which, on the 10th inst., resulted in their placing at the disposal of the department for postal-car service four trains out of New York daily and three inward, on which cars were placed running through to Chicago. In New England, owing to the region being so thickly settled and the mails so heavy, extraordinary car space is required for the proper performance of the Railway Post-Office Service. Negotiations, with a view of improving the service, have finally resulted in obtaining from the roads forming the New York and Boston through lines, via Springfield and Providence, new postal cars of the largest dimensions, to be run five times daily between Boston and New York on regular trains and upon a special train leaving New York at 5 in the morning for the performance of local service between those points and the distribution of mails arriving in New York at late hours the evening before.

**Rochester & State Line.**—The bridge over Great Valley Creek was completed Jan. 18, and the track laid across it. This bridge is 151½ feet clear span, and 35 feet above the bed of the creek; it was built by R. Comins, of Troy, N. Y. But three miles of track remain to be laid, the connection between the two sections of the road having been made in the town of Eagle, in Wyoming County. One more bridge of 125 feet span is to be erected before the track can be laid into Salamanca, and work on this is being pushed as fast as possible.

**Sabine Pass & Northwestern.**—This company has graded, tied and bridged 51 miles of its road in the last seven months at a total cost, including right of way, of \$61,000. Surveys are being made of the line from Lawrence, Texas, to Denison, and the company expects to grade 60 miles in 90 days. The charter of the company covers a line from Sabine Pass, on the Gulf of Mexico, across the State to Denison, 340 miles. Nearly half this distance the line is through excellent pine timber, now useless for want of transportation facilities, and nearly 100 miles run through the grain region of Northern Texas. The company has a land grant of 16 sections (10,240 acres) to the mile, granted by the State of Texas.

**Scioto Valley.**—The following statement covers the 10 months from March 5 to Dec. 31, during which the 50 miles from Columbus, O., to Chillicothe was operated by the company:

Passengers.....	\$51,819.39
Freight.....	61,159.38
Express, mail, etc.....	3,874.33

Total earnings (\$2,337.07 per mile).....\$116,853.30

Expenses (50.04 per cent.).....58,476.40

Net earnings (\$1,167.54 per mile).....\$58,376.90

Interest on bonds.....39,137.79

Surplus.....\$20,239.11

This report is a very good showing for a new road with local business entirely.



**Somerville & New Brunswick.**—A company by this name has been organized to build a railroad from Somerville, N. J., southeast six miles to a point on the Mercer & Somerset road in the town of Hillsborough. The capital stock is to be \$100,000. The road, if built, will complete a cross cut from Somerville to New Brunswick which has been talked about for the last 20 years or more.

**Southern Maryland.**—A suit has been begun to compel this company to comply with a contract made with S. S. Smoot for the construction of this road and the delivery of \$700,000 in stocks and bonds of the company under said contract.

**St. Louis & Southeastern.**—The Auditor's report of earnings for December is as follows :

	St. L. Div.	Ky. Div.	Tenn. Div.	Entire line.
Passengers .....	\$15,371.82	\$7,754.96	\$4,804.35	\$27,980.93
Freight .....	30,040.35	20,871.65	7,717.45	58,255.45
Express, mail, etc.,	2,495.97	1,047.43	533.37	4,076.77
<b>Total .....</b>	<b>\$48,513.94</b>	<b>\$29,674.04</b>	<b>\$13,115.17</b>	<b>\$91,303.15</b>
Earnings per mile.	231.02	302.79	279.04	257.19

As compared with December, 1878, the entire line shows a decrease of \$227.48, or 0.2 per cent.

The war between this road and the Green Line companies continues very sharp. Local rates and, it is charged, more than local rates are charged on all freight brought by the Southeastern to Nashville for shipment to points beyond, and every possible obstacle put in the way of such shipments.

**St. Paul & Pacific.**—Gov. Pillsbury, of Minnesota, having decided to transfer to that company the land earned by the completion of the St. Vincent Extension from Barnes to Crookston, the Northern Pacific has taken exception and has filed notice of its claim on the lands at and near the crossing of the two roads at Glyndon. The St. Paul & Pacific claims first right to the lands on account of prior location, but the Northern Pacific claims that its road was first built. A suit will be begun in the United States Court to settle the question.

**Tyler Tap.** This company has now 21½ miles of road in operation, from Tyler, Texas, north by  $\frac{1}{2}$  to the Texas & Pacific, and 46 miles more are graded or in course of construction. The earnings of the completed line for December were \$7,300. The cost of the completed line and equipment has been \$197,000, or \$9,100 per mile. No bonds have been placed on the market yet, but the company expects to issue 7 per cent. gold bonds at the rate of \$7,000 per mile.

**Union Pacific.**—The building, formerly a hotel, purchased by this company at Omaha some time ago has been rebuilt and fitted up for the general offices of the company, the total expenditure, including the original purchase, being about \$1,055,000. The building is 100 by 80 feet and four stories high; it has been handsomely fitted up and furnishes ample room for the company's offices, all the general and local offices of the road, and is also provided with fire-proof vaults for the storage of papers and books.

A bill has been introduced in both houses of Congress to compel the Union Pacific, under penalty of forfeiture of charter, to pro-rate on all through traffic with the Kansas Pacific, the Burlington & Missouri River in Nebraska and the Sioux City & Pacific, and to give those roads full facilities for exchange of traffic and for transfers of business at connecting points. Authority is vested in the Attorney General to begin proceedings in case of any violation of the law.

**Western Maryland.**—A meeting of the second preferred bondholders was held in Baltimore Jan. 17, when the committee presented a report understood to be in favor of the company's proposition to convert the bonds into preferred stock. No action was taken, and probably none will be taken until it is known what action the city of Baltimore will take. The city holds \$400,000 of the stock, has a fourth mortgage for \$1,000,000, and has endorsed \$1,375,000 of the first, second and third-mortgage bonds, on which it has advanced about \$939,000 to pay interest. The city Board of Finance has asked the City Solicitor for an opinion as to the position which the city will occupy in case of a foreclosure, and what lien the coupons paid by the city hold upon the road.

**Wilmington, Columbia & Augusta.**—The *Commercial and Financial Chronicle* says: "This company, lessee of the Wilmington & Weldon Railroad, has announced its inability to pay the semi-annual dividend of 3½ per cent. on the capital stock of the latter company, now due. The default is caused by loss in earnings."

The Weldon road earned less than its rental last year, for the first time, we believe. Both companies are controlled by the same parties.

**Wilmington & Northern.**—The United States Circuit Court has granted the injunction asked for to restrain this company from issuing certain mortgage bonds under the agreement of reorganization, in accordance with which the present company was formed by the bondholders who bought the Wilmington & Reading road. The ground for the injunction is that no consideration will be received for the proposed issue of bonds, and that it is therefore forbidden by the law under which the company was organized.

**Woodstock.**—The Vermont Supreme Court has made perpetual the injunction restraining this company from extending its road across the Vermont Central track at White River Junction. The Court held that the Woodstock road had a right to cross the Central by its charter, but that its action in condemning land for the purpose through the Central yard was illegal, as it would give the Woodstock Company exclusive title to the land, and it would then be under no obligation to refrain from impeding the Central's business. This decision prevents the Woodstock from making the connection with the Northern New Hampshire which it desired.

## ANNUAL REPORTS.

**Fitchburg.**

This company worked the following lines during the year ending Sept. 30, 1877:

Main Line, Boston to Fitchburg, double track.....	Miles 50.60
Watertown Branch, Junction to Waltham.....	6.60
Lancaster & Sterling Branch, South Acton to Marlboro.....	12.45
Peterboro & Shirley Branch, Ayer Junction, Mass., to Mason Village, N. H.....	23.62
Total owned.....	93.32
Vermont & Massachusetts, leased:	
Main Line, Fitchburg to Greenfield.....	56.00
Branch, Greenfield to Turner's Falls.....	2.80
Branch, Miller's Falls, Mass., to Brattleboro, Vt.....	21.31

	80.1
Total owned and leased	179.4

Total owned and leased.....	173.4
Less Brattleboro Branch, leased to Central Vermont.....	21.9
	<hr/>

Total worked..... 152.1

The company also runs trains over the Troy & Greenfield

Railroad, 37 miles, paying tolls to the State of Massachusetts

for its use; this makes the main line 143 miles long, from Boston to North Adams. On the road owned there are 50.68 miles of second track and 43.37 miles of siding; on the road leased 19.18 miles of sidings. The use of 10.5 miles of track, from Fitchburg to South Ashburnham, is leased to the Cheshire Railroad.

The equipment consists of 67 engines; 9 snow-plows; 75 passenger and 21 baggage and mail cars; 869 box and 549 platform cars; 90 coal, gravel and other cars. There was an increase during the year of 9 engines; 3 passenger cars; 238 box and 10 platform cars.

The balance sheet, condensed, is as follows:

Stock (\$42,863 per mile).....	\$4,000,000 00
Bonds (\$5,358 per mile).....	500,000 00
Notes payable (\$9,248 per mile).....	863,000 00
Balances of accounts, unclaimed dividends, etc.....	280,395 10
Suspense account.....	8,850 02
Profit and loss.....	522,168 90
<b>Total (\$66,164 per mile).....</b>	<b>\$6,174,414 06</b>
Construction accounts (\$61,594 per mile).....	\$4,814,756 89
Real estate.....	270,248 54
Improvements, Vermont & Mass. Railroad.....	499,075 80
Sinking fund.....	123,941 98
Materials and fuel.....	277,992 14
Cash and cash funds.....	195,398 71
	<b>\$6,174,414 06</b>

Notes payable were increased by \$638,000 during the year.

The earnings for the year were as follows :

	1876-77.	1875-76.	Inc. or Dec.	P. c.
Passengers.....	\$634,391 40	\$622,929 98	Inc. \$11,461 42	1.9
Freight.....	1,106,161 17	1,045,780 18	Inc. 60,380 99	5.8
Mails and express.	5,615 79	51,296 18	Inc. 319 61	0.6
Rents of road and property.....	128,245 37	127,362 73	Inc. 882 64	0.7
<b>Total.....</b>	<b>\$1,920,418 73</b>	<b>\$1,846,969 07</b>	<b>Inc. \$73,444 66</b>	<b>4.0</b>
<b>Expenses.....</b>	<b>1,363,675 97</b>	<b>1,329,838 43</b>	<b>Inc. 33,837 54</b>	<b>2.5</b>
<b>Gross earnings.....</b>	<b>\$556,737 76</b>	<b>\$517,130 64</b>	<b>Inc. \$39,607 12</b>	<b>7.7</b>
Costs of exp. per mile.....	12 44 53	12 44 53	Inc. 492 80	3.9
Net.....	3,659 66	3,909 49	Inc. 260 37	7.1
Per cent. of gross ex.....	71.01	72 00	Dec. 0.99	1.4

The net result of the year was as follows:

Net earnings	\$556,797 76
Rent of Vermont & Massachusetts R. R.	\$210,808 89
Rent of Conn. River & R. tracks	3,750 00
Interest on bonds	35,000 00
Interest, other	20,425 00
	<u>269,983 91</u>
Surplus for the year	\$286,753 85

LOCOMOTIVE RETURNS, SEPTEMBER, 1877.

Master Mechanics of all American railroads are invited to send us their monthly reports for this table.

NAME OF ROAD.	Number of miles operated.	Number of Locomotives in service.	Mileage.		No. Miles run to			Average No. of freight cars handled.	Cost per Mile in Cents for							Av. cost of fuel per ton of coal.
			Total.	Average per Run.	Ton of Coal.	Cord of Wood.	Pail of Oil.		Average cost per freight car per mile, cents.	Depreciation.	Fuel.	Stores.	Miscellaneous.	Expenses for freight and wages.	Total.	
Allegheny Valley (Tiver Division)*	139	20	105 143	250 01	35 21	19 18	24 10	0 804	7 28	3 71	0 61		6 27	17 87		
(Low Grade Div.)	120	10	46 295	250 01	27 55	21 03	21 10	0 877	4 91	4 36	0 60		5 97	15 83		
Atlantic & Great West'n (1st & 2d Divs.)	228	83	121 238	2 607	36 5	21 57			3 72	4 43	0 53	0 61	6 80	18 30	1 94 2 83	
(Third & Fourth Divs.)	197	48	133 933	2 481	41 51	20 78			2 66	4 70	0 44	0 45	5 70	14 15	1 96 2 83	
(Mahoning Division)	88	54	46 525	2 215		33 33	13 01		3 80	3 75	0 50		8 20	20 92	2 03	
Atlantic & Gulf	343	21	26 497	2 4 9	42 50	15 70			4 04	3 53	0 38		4 99	13 41	1 50	
Qairo & Vance Pass	157	11	25 062	2 278	36 67	20 75	6 10		2 40	18 1	0 55	0 36	7 66	29 28	6 05 5 25	
California Pacific	153	11	35 281	2 103	56 50	1 90			0 65	6 69	0 80		5 53	13 67	3 80 2 00	
Camden & Atlantic	67	12	138 403	2 473	35 91	16 42			5 22	14 48	0 65	0 62	7 87	32 81	8 00 5 75	
Central Pacific (Western Division)†	201	36	22 97	2 292	53 52	18 50			4 23	12 38	0 54	0 62	6 99	24 75	5 56 5 75	
(Visalia Division)†	187	10	22 175	2 016	38 76	13 88			5 09	17 06	0 79	0 26	7 92	31 12	5 56 5 75	
(Tulare Division)†	171	11	47 520	2 501	50 08	13 03			4 06	11 88	0 58	0 12	7 58	24 22	6 50 5 75	
(Los Angeles, Yuma, San Diego and Wilcox Divs.)†	408	19	81 451	2 396	24 71	16 83			7 68	23 28	0 75	0 39	9 44	41 54	5 75	
(Sacramento Division)†	120	34	17 830	2 548	37 64	16 70			3 29	15 28	0 75	0 30	8 61	28 23	5 75	
(Oregon Division)†	152	7	64 519	2 081	35 43	25 16	6 05		7 05	20 48	0 50	0 57	8 43	37 25	6 50 5 75	
(Truckee Division)†	203	25	47 839	2 518	42 53	18 33			7 41	15 58	0 56	0 42	7 59	31 66	6 50 5 75	
(Humboldt Division)†	201	19	68 294	2 732	41 31	16 31			5 26	30 33	0 74	0 54	7 30	34 17	6 50 5 75	
(Salt Lake Division)†	219	25	62 093	2 513	45 33	63 49	27 3		3 12	4 25	0 67	0 68	5 72	14 54	17 50 5 50	
Cleve., Col., Cin. & Ind. (Colbus Div.)	138	63	19 516	3 040	41 13	45 63	19 40		3 82	4 97	0 63	1 24	5 85	15 51	1 75 5 50	
(Indianapolis Div.)	203	63	60 633	2 304	45 93	21 03			3 52	4 48	0 59	0 24	5 87	15 38	1 75 5 50	
(Cincinnati Div.)	139	3	17 153	2 859	50 30	25 56			1 41	3 93	0 27	0 29	6 30	12 90	1 84 2 38	
Cleveland & Mahoning Valley	41	6	178 347	2 316	60 44	9 71	17 30	0 752	2 97	2 6	0 48	0 26	6 31	14 53	1 15 3 30	
Cleveland & Pittsburgh	199	77	39 680	2 204		31 05			0 82		0 64		5 54	7 00		
Del., Lacka. & West. (Bloomsburg Div.)	80	18	37 612	1 974	43 07	15 90	19 30	0 969	3 46	4 25	0 69	1 64	6 43	16 47	1 88 1 88	
Eric & Pittsburgh*	96	20														
Hannibal & St. Joseph	296															
Illinois Central (Chicago Div.)‡																
(South Div.)‡																
(North Div.)‡																
(Iowa Div.)‡																
(Springfield Div.)‡																
Jeffersonville, Madison & Indianapolis*	226	4	94 683	2 3 4	4 39	26 7	4 21	25 6 0 700	2 86	6 33	0 51	1 85	5 69	17 24	2 50 2 30	
Kansas Pac. & controlled lines*	781	74	167 128	2 238	29 92	12 9			4 85	11 46	0 41		6 75	23 47	3 28 5 40	
Kansas City, St. Jo. & Council Bluffs*	875	20	84 604	2 099	49 10		26 6	17 30	4 00	6 10	0 40		6 60	17 00	2 80 3 50	
Lake Shore & Mich. So. (Buff. Div.)††	90	77	2 7	1 963	37 37	44 8			3 22	8 43	0 38		5 61	17 63	3 05 5 69	
(Toledo Div.)††	113	83	320 33	1 949	37 05				4 02	7 68	0 34		5 62	18 42	2 70 4 30	
(Erie Div.)††	85	147	147 368	7 733	31 73	34 1			3 83	9 54	0 43		5 88	18 97	3 12 4 08	
(Mich. So. Div.)††	207	366	43 1770	38 21	61 57				4 76	8 90	0 26		5 80	19 59	3 55 4 63	
Louisville & Nashville (First Div.)††	332	115	115 79		27 06	33 60	11 74		4 19	8 85	0 43	1 37	6 97	21 81	0 089 2 51	
(Second Div.)††	200	83	189 179		27 0		13 24		3 75	8 59	0 46	1 82	6 01	20 32	0 09 2 75	
(Memphis Div.)††	131	33	44 04		29 50		13 10		5 13	1 29	0 53	1 67	5 90	24 5	0 132 3 50	
(Nashville & Decatur Div.)††	122		42 07		34 0		12 48		2 56	1 13	0 62	1 43	6 45	19 19	0 108 3 38	
(South & North. At. R.R.)††	183	36	61 48		29 73		12 30		4 17	7 87	0 71	1 43	6 42	20 49	0 09 2 25	
Marquette, Houghton & Ontonagon	168	20	37 86	1 956	56 43		30 84		1 90	1 18	0 48		5 66	17 11		
Missouri, Kansas & Texas†	786	70	236 09	3 373	31 87		9 69	15 70	4 94	6 52	0 57		6 29	18 32	2 63	
North'n Cent'l (Elm. & C. and 'gua Div.)	147	45	118 187	2 636	31 95		19 23		3 88	4 87	0 64		5 68	15 07	0 6 224	
Pennsylvania (New York Division)§§	120	115	21 886	2 361	33 47		11 24		6 40	8 10	0 50		5 50		2 605 2 58	
(Amboy Division)§§	154	45	76 384	1 697	57 50		19 53		3 40	4 70	0 50		8 60	26 530		
(Belvidere Division)§§	163	34	58 590	1 743	39 42		13 51		5 30	6 80	0 80		12 90		2 60 5 30	
(Philadelphia Division)§§	191	175	141 247	3 35	27 59		14 9		2 80	3 90	0 70		7 40		1 02 2 64	
(Middle Division)§§	132	88	284 3	3 281	30 31		19 31		3 10	3 50	0 50		7 10		1 00 2 64	
(Pittsburgh Div., E. End)§§	71	176	176 777	2 070	24 50		30 39		4 30	7 20	0 70		0 70		1 00 2 64	
(Pittsburgh Div., West End)§§	96	239	719	2 403	32 28		13 23		3 40	3 20	0 6		7 0		1 00 2 64	
(Tyrone Division)§§	107	20	60 122	2 073	21 09		19 84		4 0	5 00	0 50		9 50		1 00 2 64	
(West Pennsylvania Division)§§	164	24	43 744	1 823	38 63		37 31		5 60	2 90	0 30		8 30		1 00 2 64	
(Lewistown Division)§§	56	7	15 809	2 258	29 75		16 45		2 60	3 40	0 60		6 30		1 00 2 67	
(Bedford Division)§§	57	4	10 844	2 711	26 89		37 17		0 90	3 90	0 30		5 10		1 00 2 68	
Pitts., Ft. Wayne & Chi. (East'n Div.)*	371	151	359 581	2 381	53 95		17 22	14 80	0 851	2 43	3 04	0 62	1 91	6 23	14 82	1 82 1 83
(Western Div.)*	260	97	337 350	2 443	41 90		18 75	22 90	0 842	3 98	5 01	0 43	1 19	6 07	17 18	2 10 2 10
Pitts., Cin. & St. L. (Little Miami Div.)	197	39	91 905	2 663	18		12 37	17 07	0 84	3 73	4 44	0 68	2 07	5 36	0 6	
(Pitts. & St. L. Div.)	224	79	216 187	2 337	30 79		16 59	18 86	0 906	6 47	4 19	0 58	1 75	5 96	18 95	1 20 3 00
Pittsburgh, Titusville & Buffalo	158		59 890		36 11		18 06	16 80	1 135	3 76	5 10	0 63		5 89	15 37	
St. Louis, I. M. & So. (Arkansas Div.)...	325	32	93 700	2 928		45 10	16 10		3 13	5 42	0 54		6 45	15 54		2 45
St. Louis & San Francisco	328		73 720		31 60		15 00		3 63	6 06	0 53		5 54	15 25		2 10 2 10
St. Louis & Southeastern (St. Louis Div.)	210															
(Nashville Div.)	146															
Stockton & Copperopolis	49	3	3 822	1 734	34 76	58 87	17 61		1 80	13 11	0 81	0 75	9 10	35 51	3 50 5 75	
West Jersey §§	128	18	40 888	2 272	43 41		16 34		2 60	8 80	0 60		12 00		6 50 4 75	

\* Five empty cars rated as three loaded ones.

‡ Switching engines allowed 6 miles per hour; helping engines actual distance and 4 miles per hour while waiting trains.

6 Fuel not estimated

Switching and work-train engines allowed 6 miles per hour; no switching mileage allowed to train engines.

\* Three empty cars rated as two loaded ones.

11 Water service and fuel stations (not included above), 0.82 ct. per mile; rental of engine, 0.39 ct. per mile; three empty cars rated as loaded ones; switching and work-train engines allowed 8 miles per hour; no switching mileage allowed to twin engines.

28 Engineers', firemen's and winers' wages not included in cost.

The ton of coal is 2,000 lbs., unless otherwise specified; 25 bushels counted to the ton.